

SERVICE MANUAL

DOC. NO. 438.9227-45/05 EDITION 20.2009

EX618 – EX670 SU620 – SU675 W620 – W675 Compass Control

Up to machine No. SU-model:

SU620	-00520/120946 -00521/400282-402182	SU625	-00595/106646 -00521/401173-402182
SU630	-00595/106611 -00521/400106-402182	SU640	-00650/107383
SU655	-00725/105493	SU675	-00795/102509

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NOTICE TO SERVICE PERSONNEL

INSTALLATION

Improper installation of Wascomat laundry and wet cleaning equipment can result in personal injury and severe damage to the machine.

REFER INSTALLATION TO QUALIFIED PERSONNEL!

RISK OF ELECTRIC SHOCK

The equipment utilizes high Voltages. Disconnect electric power before servicing.

The use of proper service tools and techniques, and the use of proper repair procedures, is essential to the safety of service personnel and equipment users.

REFER SERVICING TO QUALIFIED SERVICE PERSONNEL!

RISK OF PERSONAL INJURY

This equipment contains moving parts, and some components that may have sharp edges. Improper or careless service procedures may result in serious injury to service personnel.

REFER SERVICING TO QUALIFIED SERVICE PERSONNEL!

ABOUT THIS MANUAL

This manual is intended to provide service guidance to qualified service personnel.

Wascomat and its authorized dealers make no determination regarding the qualification of individuals requesting this service manual. The service provider assumes all risks inherent to the servicing of this equipment and any risks that arise as result of the lack of knowledge or ability of any person servicing this equipment.

REFER SERVICING TO QUALIFIED SERVICE PERSONNEL!

NOTE:

Improper installation or servicing of Wascomat equipment will void the manufacturer's warranty!

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Service Manual

EX618 – EX670, SU620 – SU675, W620 –W675

Compass Control

WARNING: ALL OPERATING AND MAINTENANCE PROCEDURES SHOWN ON THE NEXT PAGE OF THIS MANUAL MUST BE FOLLOWED DAILY FOR PROPER OPERATION OF YOUR WASCOMAT MACHINE.

PLEASE ENTER THE FOLLOWING INFORMATION AS IT APPEARS ON THE MACHINE(S) DATA PLATE(S).

MACHINE TYPE OR MODEL	
MACHINE SERIAL NUMBER(S)	
ELECTRICAL CHARACTERISTICS: _____ VOLTS, _____ PHASE, _____ HZ.	

MAKE CERTAIN TO KEEP THIS MANUAL IN A SECURE PLACE FOR FUTURE REFERENCE.



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SAFETY AND WARNINGS SIGNS

Replace If Missing Or Illegible

One or more of these signs must be affixed on each machine as indicated, when not included as part of the front instruction panel.

LOCATED ON THE OPERATING INSTRUCTION SIGN OF THE MACHINE:

CAUTION

1. Do not open washer door until cycle is completed, operating light is off, and wash cylinder has stopped rotating.
2. Do not tamper with the door safety switch or door lock.
3. Do not attempt to open door or place hands into washer to remove or add clothes during operation. This can cause serious injury.

PRECAUCION

1. No abra la puerta de la máquina lavadora sino hasta que la máquina haya terminado su ciclo, la luz operativa esté apagada y el cilindro de lavado haya completamente terminado de girar.
2. No interfiera o manipule el switch o la cerradura de la puerta.
3. No trate de abrir la puerta o meta las manos dentro de la máquina para meter o sacar ropa mientras la máquina está en operación, pues puede resultar seriamente herido.

MACHINE MUST NOT BE USED BY CHILDREN

LAS MÁQUINAS NO DEBEN SER USADAS POR NIÑOS

LOCATED AT THE REAR OF THE MACHINE:

INSTALLATION AND

MAINTENANCE WARNINGS – AVERTISSEMENT

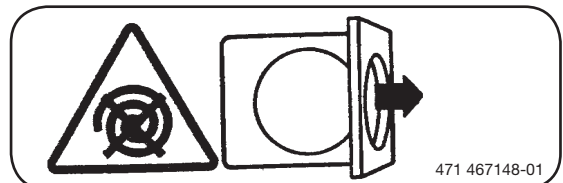
1. This machine **MUST** be securely bolted according to the installation instructions, to reduce the risk of fire and to prevent serious injury, or damage to the machine.
Pour reduire les risques d'incendie, fixer cet appareil sur un plancher beton sans revêtement.
2. If installed on a floor of combustible material, the floor area below this machine must be covered by a metal sheet extending to the outer edges of the machine.
3. This machine **MUST** be connected to a dedicated electrical circuit to which no other lightning unit or general purpose receptacle is connected. Use copper conductor only.
Utiliser seulement des conducteurs en cuivre.
4. This machine **MUST** be serviced and operated in compliance with manufacturer's instructions. **CHECK DOOR LOCK EVERY DAY FOR PROPER OPERATION TO PREVENT INJURY OR DAMAGE. IF THE DOOR LOCK FAILS TO OPERATE PROPERLY, PLACE THE MACHINE OUT OF ORDER UNTIL THE PROBLEM IS CORRECTED.**
5. Disconnect power prior to servicing of machine.
Deconnecter cet appareil del'alimentation avant de proceder a l'entretien.
6. To remove top panel, first remove screws at the rear. When remounting the top, reinstall them. To remove the top panel on models on which it is secured by one or two keylocks, use the keys provided in the drum package. Be certain to relock after remounting the top panel.

MANUFACTURED BY WASCATOR
DISTRIBUTED BY WASCOMAT, INWOOD, NEW YORK, USA

471 766202-04

LOCATED ON THE DOOR:

If you need to order more safety or warning signs, call Wascomat's parts department at 516-371-2000, or call your local dealer.



471 467148-01



NOTICE TO: OWNERS, OPERATORS AND DEALERS OF WASCOMAT MACHINES

IMPROPER INSTALLATION AND INADEQUATE MAINTENANCE, POOR HOUSEKEEPING AND WILLFUL NEGLECT OR BYPASSING OF SAFETY DEVICES MAY RESULT IN SERIOUS ACCIDENTS OR INJURY. TO ASSURE THE SAFETY OF CUSTOMERS AND/OR OPERATORS OF YOUR MACHINE, THE FOLLOWING MAINTENANCE CHECKS MUST BE PERFORMED ON A DAILY BASIS.

1. Prior to operation of the machine, check to make certain that all operating instructions and warning signs are affixed to the machine and legible. (See the following page of this manual for description and location of the signs.) Missing or illegible ones must be replaced immediately. Be sure you have spare signs and labels available at all times. These can be obtained from your dealer or Wascomat.
2. Check the door safety interlock, as follows:
 - (a) OPEN THE DOOR of the machine and attempt to start in the normal manner:

For CLARUS microprocessor models, choose a program and press the START button.

THE MACHINE(S) MUST NOT START !

- (b) CLOSE THE DOOR to start machine operation and, while it is operating, attempt to open the door without exerting extreme force on the door handle. The door should remain locked!

If the machine can start with the door open, or can continue to operate with the door unlocked, the door interlock is no longer operating properly. The machine must be placed out of order and the interlock immediately repaired or replaced. (See the door interlock section of the manual.)

3. DO NOT UNDER ANY CIRCUMSTANCES ATTEMPT TO BYPASS OR REWIRE ANY OF THE MACHINE'S SAFETY DEVICES, AS THIS CAN RESULT IN SERIOUS ACCIDENTS.
4. **Be sure to keep the machine(s) in proper working order:** Follow **all** maintenance and safety procedures. Further information regarding machine safety, service and parts can be obtained from your dealer or from Wascomat through its Technical Support Department - 516/371-0700.

All requests for assistance must include the model, serial number and electrical characteristics as they appear on the machine identification plate. Insert this information in the space provided on the previous page of this manual.

5. **WARNING:** DO NOT OPERATE MACHINE(S) WITH SAFETY DEVICES BYPASSED, REWIRED OR INOPERATIVE! DO NOT OPEN MACHINE DOOR UNTIL DRUM HAS STOPPED ROTATING!

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Safety Precautions



The machine is only intended for water-wash use.

Do not allow minors to use the machine.

Do not hose down the machine with water.

The machine's door lock must under no circumstances be bypassed.

If the machine develops a fault, this must be reported to the person in charge as soon as possible. This is important both for your safety and that of others.

The machine is not intended to be used by people (including minors) with reduced physical or mental capacity or lack of experience and knowledge. Such people must be instructed in the use of the machine by a person who has responsibility for their safety. Minors must be supervised to ensure that they do not play with the machine.



All external equipment which is connected to the machine must be CE/EMC-approved and connected using an approved shielded cable.

Warnings

The service manual contains the following warnings concerning serious personal injury. Next to each warning is a reference to the page and section where the warning text is located in the manual.



DANGER



Take care when measuring the motor control system since all components have a potential difference of approximately 300V in relation to protective earth and neutral.

The components will contain dangerous voltages when the green LED on the motor control board is on.

The motor control system will remain live for 10-30 seconds after cutting the power to the machine and the motor has stopped running.

		EX618	EX625	EX630	EX640	EX655	EX670
Innerdrum							
volume	litres/ft³	75/2.6	105/3.7	130/4.6	180/6.4	240/8.5	300/10.6
diameter	mm/inch	520/20 1/2	595/23 7/16	650/25 9/16	725/28 9/16	795/31 5/16	795/31 5/16
Drum speed							
wash	rpm	49	49	49	44	42	42
extraction	rpm	1100	1025	980	930	890	820
Heating							
electricity	kW	5.4/7.5	7.5/10	13	18	23	23
steam		x	x	x	x	x	x
hot water		x	x	x	x	x	x
G-factor		350	350	350	350	350	300
Weight, net	kg/lbs	159/350	201/443	267/588	350/771	400/882	509/1122

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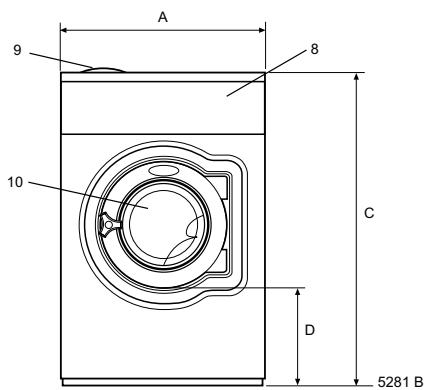
		W/SU620	SU625	W/SU630	W/SU640	W/SU655	W/SU675
Innerdrum							
volume	litres/ft³	85/3.0	105/3.7	130/4.6	180/6.4	250/8.8	330/11.7
diameter	mm/inch	520/20 1/2	595/23 7/16	595/23 7/16	650/25 9/16	725/28 9/16	795/31 5/16
Drum speed							
wash	rpm	49	49	49	44	44	42
extraction	rpm	528/694	649	494/649	471/619	446/587	427/561
Heating							
electricity	kW	5.4/7.5	10	7.5/10	13	18	23
steam		x	x	x	x	x	x
hot water		x	x	x	x	x	x
G-factor		81/140	140	81/140	81/140	81/140	81/140
Weight, net	kg/lbs	136/300	374	175/386	228/503	287/633	330/727

[illegible]

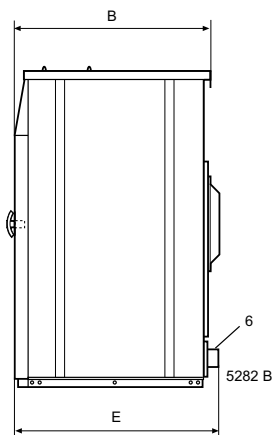
1	Electrical connection
2	Cold water
3	Hot water
4	Hard water (option)
5	Steam connection
6	Drain
7	Liquid detergent supply
8	Control panel
9	Soap box
10	Door opening, EX618: \varnothing 310 mm/12 3/16", EX625: \varnothing 365 mm/14 3/8", EX630: \varnothing 395 mm/15 9/16", EX640, EX655, EX670: \varnothing 435 mm/17 1/8"

	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	R	S
EX618	720	690	1115	355	720	825	45	1030	220	1010	135	910	830	360	100	240	–
EX625	830	705	1300	365	740	910	45	1115	220	1095	135	995	910	415	100	295	–
EX630	910	785	1325	435	825	1035	125	1245	215	1225	300	1125	–	–	100	305	455
EX640	970	870	1410	470	945	1120	115	1330	230	1290	315	1205	370	410	100	335	485
EX655	1020	915	1445	500	955	1155	100	1360	215	1320	300	1240	350	360	100	360	510
EX670	1020	1060	1445	500	1135	1155	100	1360	215	1320	300	380	–	–	100	360	335

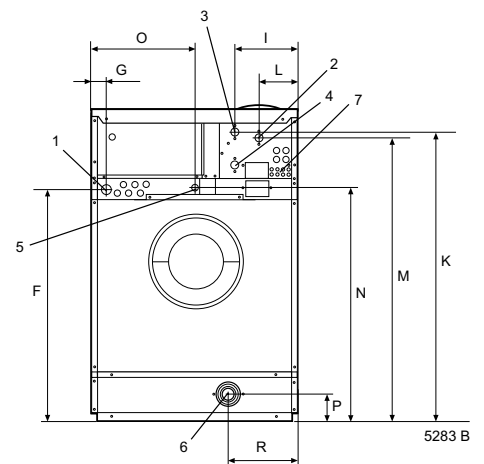
EX618, EX625, EX630



Front

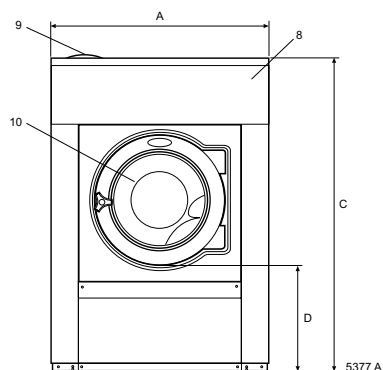


Right side

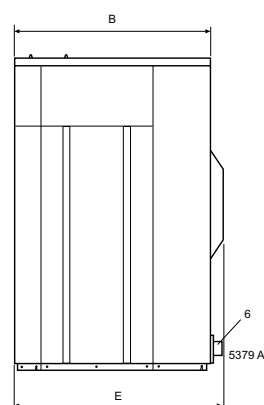


Rear side

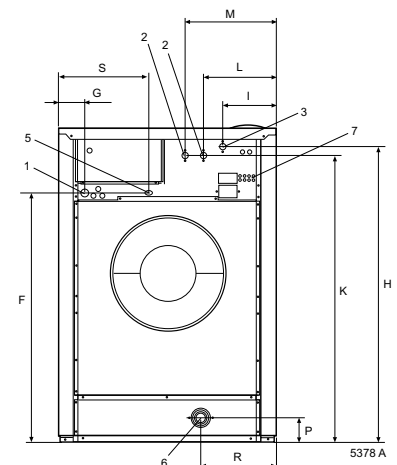
EX640, EX655, EX670



Front



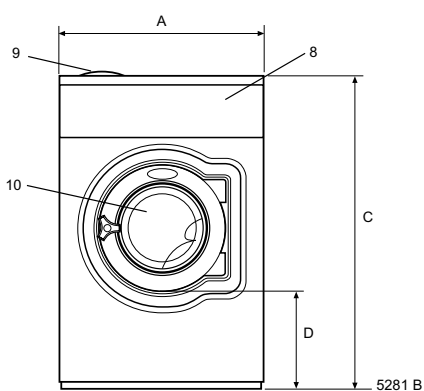
Right side



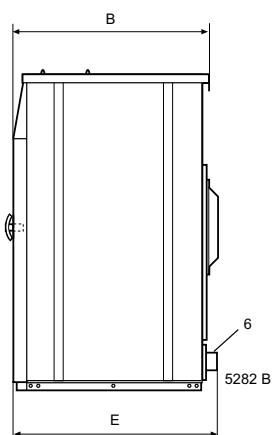
Rear side

in inch	A	B	C	D	E	F	G	H	I	K
EX618	28 3/8	27 3/16	43 7/8	14	28 3/8	32 1/2	1 3/4	40 9/16	8 11/16	39 3/4
EX625	32 11/16	27 3/4	51 3/16	14 3/8	29 1/8	35 13/16	1 3/4	43 7/8	8 11/16	43 5/16
EX630	35 13/16	30 7/8	52 3/16	17 1/8	32 1/2	40 3/4	4 15/16	49	8 7/16	48 1/4
EX640	38 3/16	34 1/4	55 1/2	18 1/2	37 3/16	44 1/8	4 1/2	52 3/8	9 1/16	50 13/16
EX655	40 3/16	36	56 7/8	19 11/16	37 5/8	45 1/2	3 15/16	53 9/16	8 7/16	51 15/16
EX670	40 3/16	41 3/4	56 7/8	19 11/16	44 11/16	45 1/2	3 5/16	53 9/16	8 7/16	51 15/16

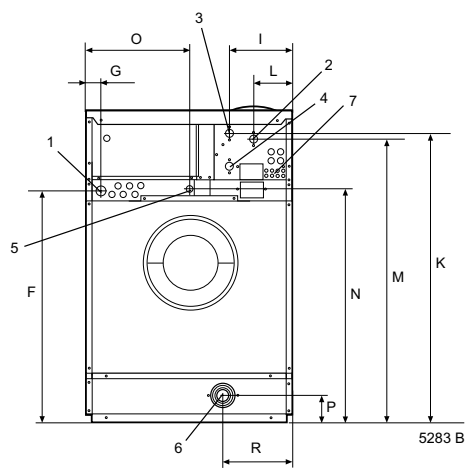
in inch	L	M	N	O	P	R	S
EX618	5 5/16	35 13/16	32 11/16	14 3/16	3 5/16	9 7/16	–
EX625	5 5/16	39 3/16	35 13/16	16 5/16	3 5/16	11 5/8	–
EX630	11 13/16	44 5/16	–	–	3 5/16	12	17 15/16
EX640	12 3/8	47 7/16	14 9/16	16 1/8	3 5/16	13 3/16	19 1/8
EX655	11 13/16	48 13/16	13 3/4	14 15/16	3 5/16	14 3/16	20 1/16
EX670	12 3/16	14 15/16	–	–	3 15/16	14 3/16	13 3/16

EX618, EX625, EX630

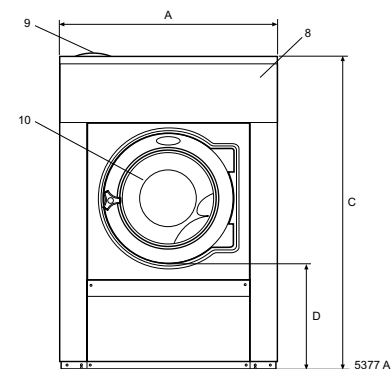
Front



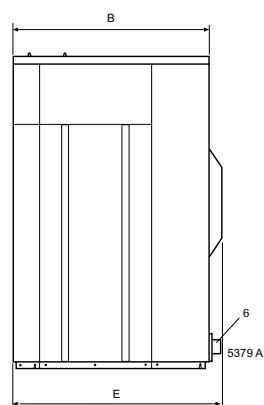
Right side



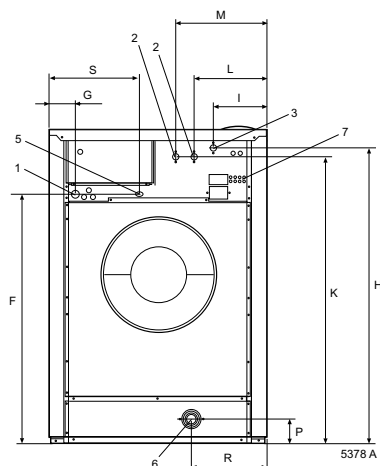
Rear side

EX640, EX655, EX670

Front



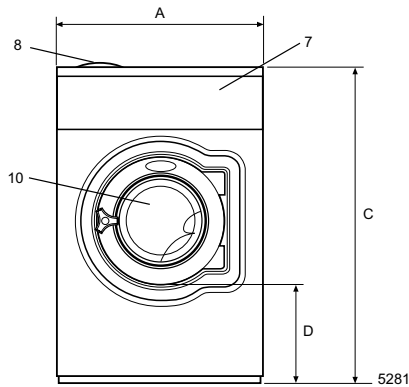
Right side



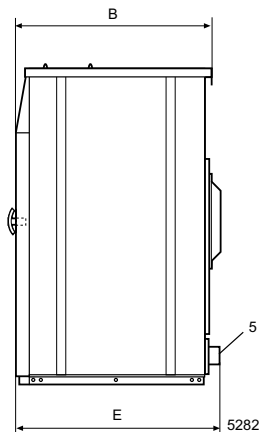
Rear side

1	Electrical connection
2	Cold water
3	Hot water
4	Steam connection
5	Drain
6	Liquid detergent supply
7	Control panel
8	Soap box
9	Water reuse
10	Door opening, W/SU620: \varnothing 310 mm/12 3/16", SU625, SU630: \varnothing 365 mm/14 3/8", W630, SU640: \varnothing 395 mm/15 9/16", W640, W/SU655, W/SU675: \varnothing 435 mm/17 1/8"

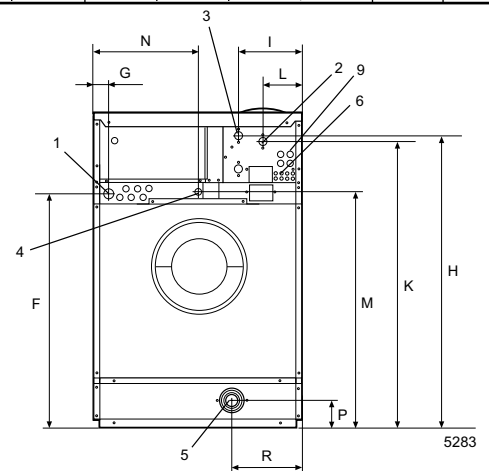
in mm	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	R
W/SU620	660	730	1115	355	765	825	45	1030	215	1010	130	830	385	–	100	210
SU625	720	705	1200	365	740	910	45	1115	215	1095	130	910	420	–	100	235
W/SU630	720	790	1200	365	825	910	45	1115	215	1095	130	910	420	–	100	235
W640	750	880	1325	435	915	1035	45	1245	130	1225	210	1040	325	295	100	225
SU640	750	880	1325	435	915	1035	45	1245	130	1225	210	1040	325	295	100	225
W655	830	955	1410	470	990	1120	45	1330	160	1290	245	1125	325	325	100	265
SU655	830	955	1410	470	990	1120	45	1330	160	1290	245	1125	325	325	100	265
W675	910	1040	1445	500	1075	1155	45	1365	160	1325	245	1155	280	325	100	210



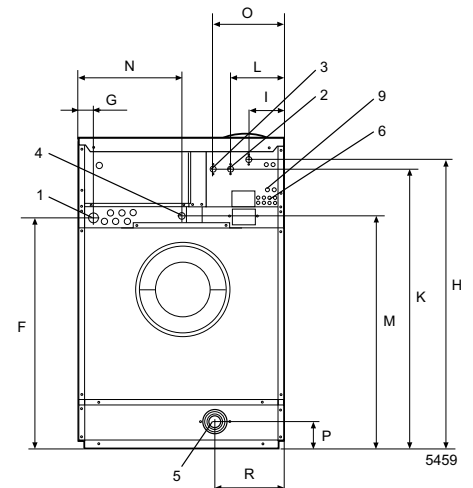
Front



Right side



Rear side

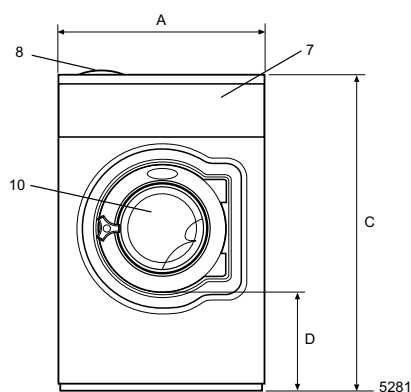
W/SU620-630


Rear side

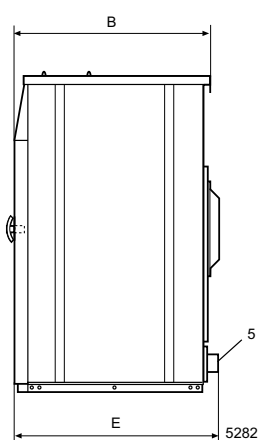
W/SU640-675

in inch	A	B	C	D	E	F	G	H	I	K
W/SU620	26	28 3/4	43 7/8	14	30 1/8	32 1/2	1 3/4	40 9/16	8 7/16	39 3/4
SU625	28 3/8	27 3/4	47 1/4	14 3/8	29 1/8	35 13/16	1 3/4	40 7/8	8 7/16	43 1/8
W/SU630	28 3/8	31 1/8	47 1/4	14 3/8	32 1/2	35 13/16	1 3/4	40 7/8	8 7/16	43 1/8
W640	29 1/2	34 5/8	52 3/16	17 1/8	36	40 3/4	1 3/4	49	5 1/8	48 1/4
SU640	29 1/2	32 11/16	52 3/16	14 3/8	36	40 3/4	1 3/4	49	5 1/8	48 1/4
W655	32 11/16	37 5/8	55 1/2	19 1/2	39	44 1/8	1 3/4	52 3/8	6 5/16	50 13/16
SU655	32 11/16	37 5/8	55 1/2	17 1/8	39	44 1/8	1 3/4	52 3/8	6 5/16	50 13/16
W675	35 13/16	40 15/16	56 7/8	19 11/16	42 5/16	45 1/2	1 3/4	53 3/4	6 5/16	52 3/16

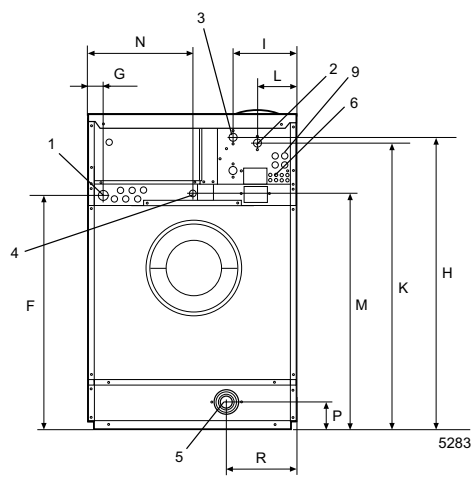
in inch	L	M	N	O	P	R
W/SU620	5 1/8	32 11/16	15 3/16	–	3 15/16	8 1/4
SU625	5 1/8	35 13/16	19 9/16	–	3 15/16	9 1/4
W/SU630	5 1/8	35 13/16	16 9/16	–	3 15/16	9 1/4
W640	8 1/4	40 15/16	12 13/16	11 5/8	3 15/16	8 7/8
SU640	8 1/4	40 15/16	12 13/16	11 5/8	3 15/16	8 7/8
W655	9 5/8	44 5/16	12 13/16	12 13/16	3 15/16	10 7/16
SU655	9 5/8	44 5/16	12 13/16	12 13/16	3 15/16	10 7/16
W675	9 5/8	45 1/2	11	12 13/16	3 15/16	8 1/4



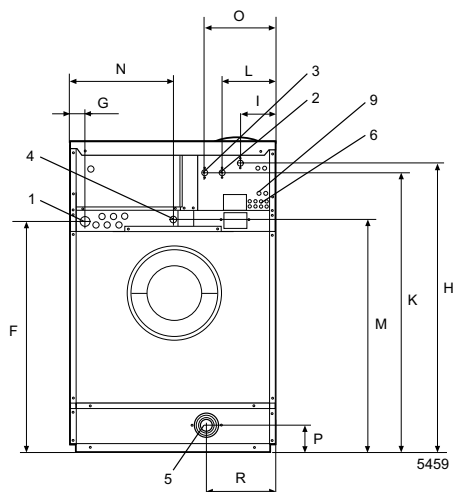
Front



Right side



Rear side

W/SU620-630

Rear side

W/SU640-675

	EX618	EX625	EX630	EX640	EX655	EX670
Frequency of the dynamic force Hz	18.3	17.1	16.3	15.5	14.8	13.7
Max floor load lbs force at extraction kN	417±110 1.9±0.5	560±112 2.5±0.5	703±114 3.1±0.5	944±221 4.2±1.0	1158±221 5.2±1.0	1387±277 6.2±1.2

	W620/ SU620	W625/ SU625	W630/ SU630	W640/ SU640	W655/ SU655	W675/ SU675
Frequency of the dynamic force Hz	9.3/11.6	8.7/10.8	8.7/10.8	8.3/10.3	7.9/9.8	7.5/9.4
Max floor load lbs force at extraction kN	375±696/ 375±741 1.7±3.1/ 1.7±3.3	468±813/ 468±896 2.1±3.6 2.1±4.0	518±912/ 518±1050 2.3±4.1/ 2.3±4.7	648±1057/ 611±1320 2.9±4.7/ 2.7±5.9	842±1189/ 842±1663 3.7±5.3/ 3.7±7.4	1019±1310/ 948±1974 4.5±5.8/ 4.2±8.8

Machine presentation

Description

General

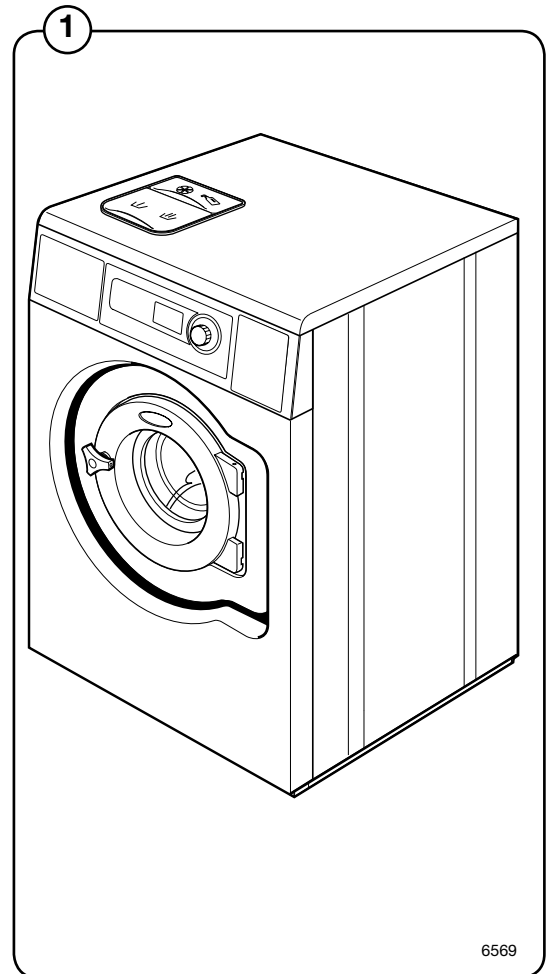
- ① The machines covered in this service manual include the following models:

Drum volume litres/ft ³	Model name
75/2.6	EX618
85/3.0	W/SU620
105/3.7	EX625, W/SU625
130/4.6	EX630, W/SU630
180/6.4	EX640, W/SU640
240/8.5	EX655
250/8.8	W/SU655
300/10.6	EX670
330/11.7	W/SU675

The machines feature an electronic programme unit with fixed washing programmes that may be changed using optional accessories. The programme unit also has an in-built self-diagnosis programme, which increases the possibilities for quick troubleshooting.

The motor is frequency-controlled and is controlled by an advanced motor control. This allows precise and flexible control of the motor rpm for any application.

The machines are supplied to customer specifications with e.g. electric or steam heating or no heating, and may be connected to various combinations of cold, warm and hard water.



Function

General

- ② This section presents a general overview of the functions of the machine. Most functions are then presented in detailed in separate chapters later on in this service manual.

The machine is freely suspended, which means the outer drum and motor are mounted on a supporting "cradle" that rests on four shock absorbers for dampening the imbalance in the machine.

The washer drum (inner drum) is belt driven by a motor. This motor is located at the bottom of the machine and is mounted on the cradle with a belt tensioner. The inner drum is mounted to the outer drum at the rear plate with two bearings sealed against leakage with sealing rings.

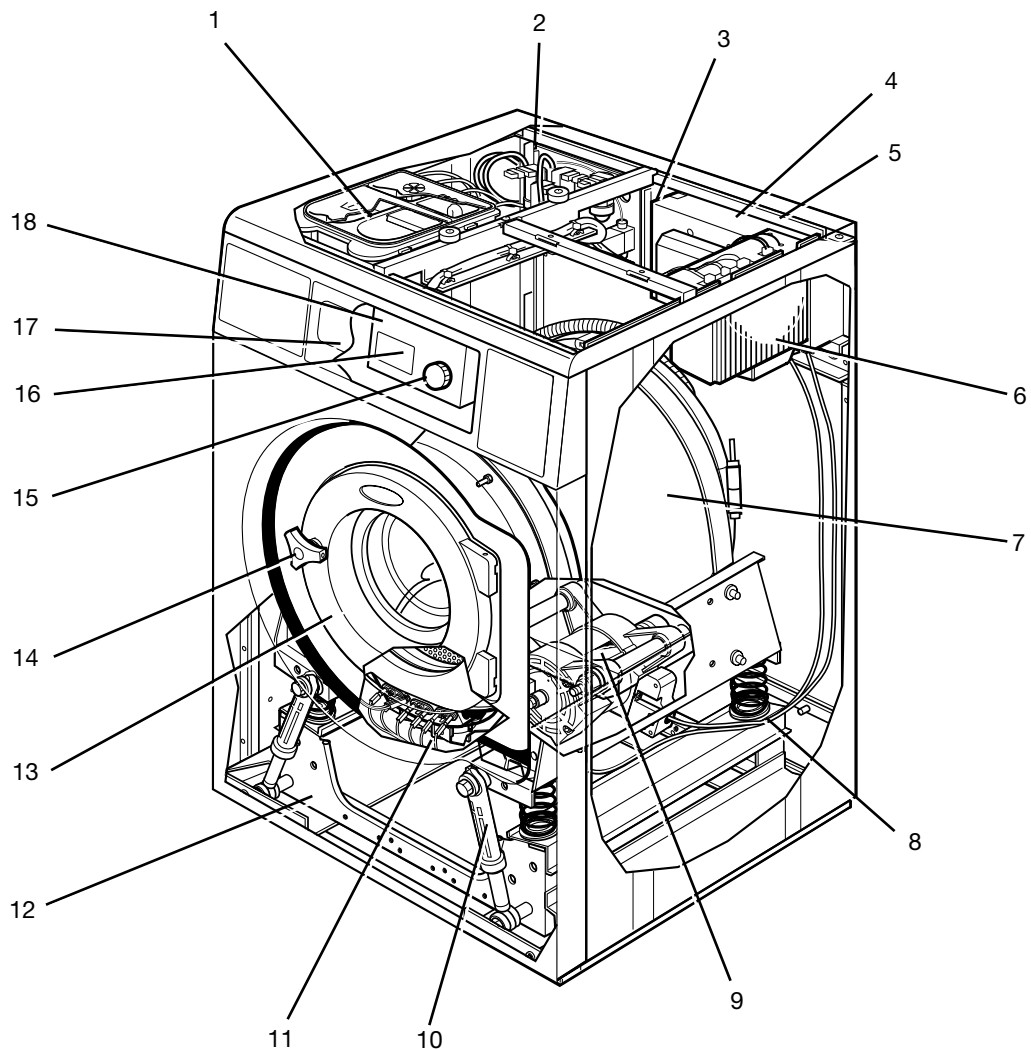
The drain valve is a water-controlled diaphragm valve alternatively, an electrical drain valve or drain pump.

The door is of sturdy type that is interlocked with a lock module when in operation.

The control panel contains a program knob for selecting the fixed wash programs and a display.

The program unit is mounted inside the control panel. Contactor, water valves, etc., are located at the back of the machine.

2



- | | |
|--------------------------------------|--|
| 1. Detergent drawer | 10. Shock absorber (not SU- and W-model) |
| 2. Water inlet valves | 11. Avloppsventil |
| 3. Power supply | 12. Support |
| 4. I/O-board | 13. Door |
| 5. Rear electrical module | 14. Door lock |
| 6. Motor control | 15. Program knob |
| 7. Outer drum | 16. Display |
| 8. Coil spring (not SU- and W-model) | 17. Control panel |
| 9. Motor | 18. Program unit |

EX - model shown

Program unit

- ③ The control panel contains a program knob and a display. The panel can also be equipped with two preset buttons.

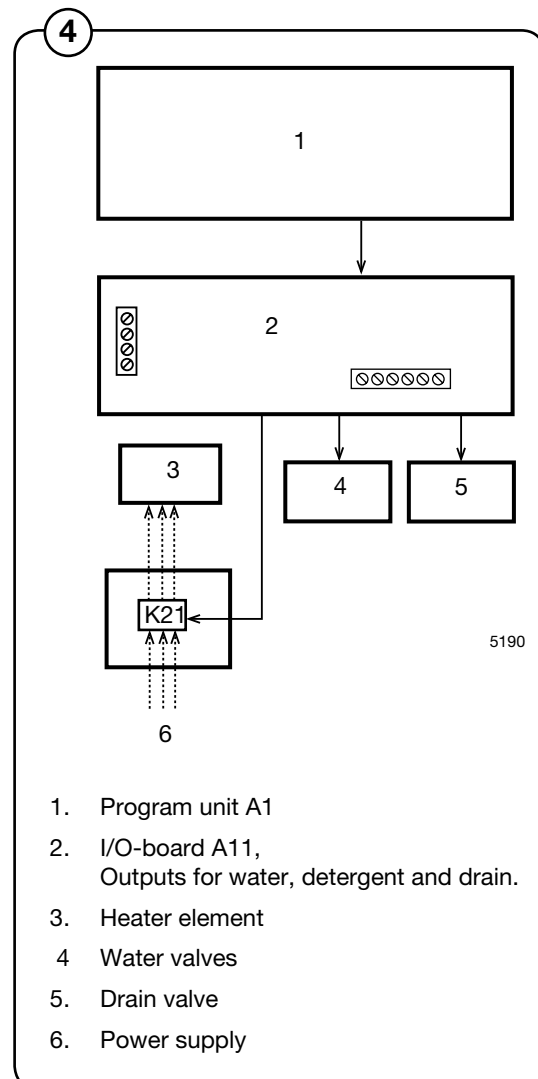
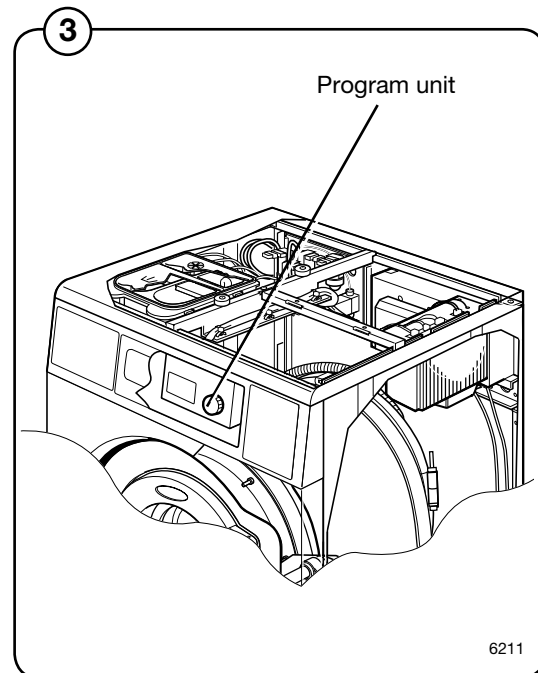
The control panel and display are used by:

- the user to select the machine's fixed wash programs, to select up to two options for each wash program and for information on the wash process and any fault indicators.
- service personnel for navigation and control of the program unit's service program.
- programming personnel for setting and program adjustment in the program unit's software.

- ④ If present, the preset buttons are used for direct start of two preset wash programs.

Using information on torque values from the motor, the weight of each wash is measured before each wash program in order to adapt the amount of water used for washing.

The program unit controls the water valves, drain valve and heating via an I/O board in the rear electrical module. Control signals to external units, such as detergent pumps or external water valves can also be engaged here.

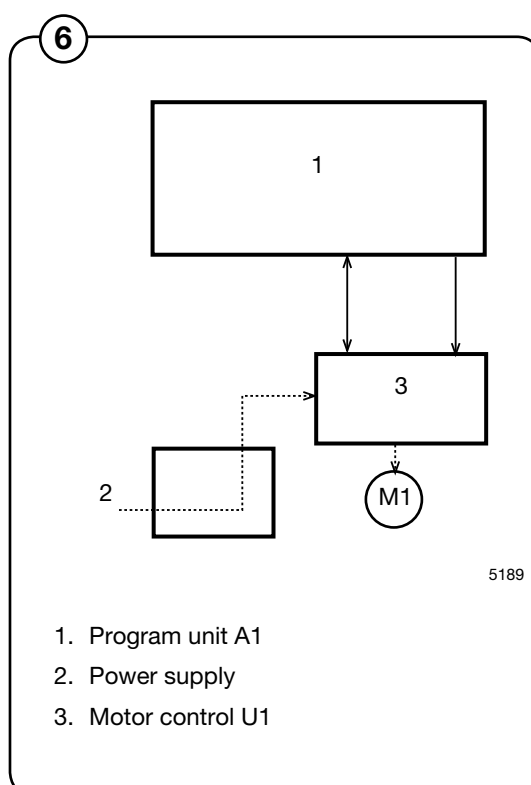
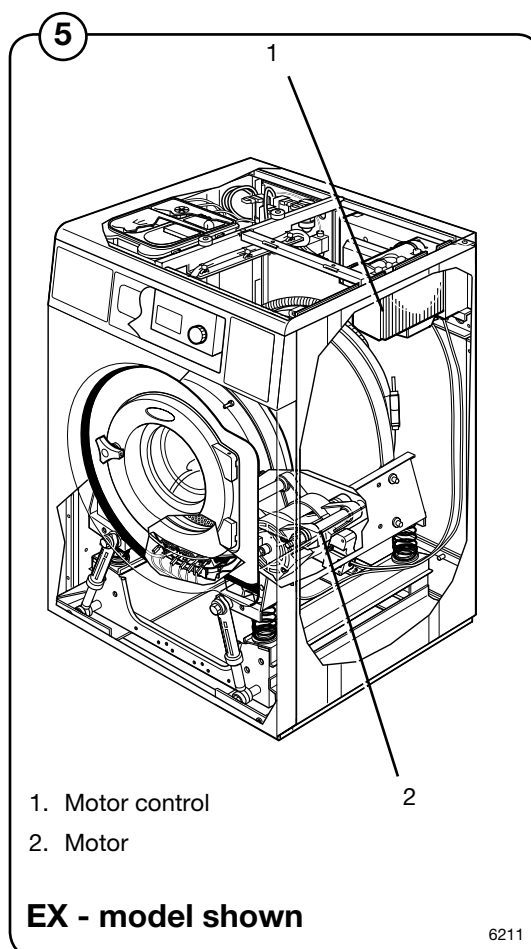


Motor and motor control

- 5 The washer drum (inner drum) is belt driven by a frequency controlled motor. The motor is located on a motor shelf under the outer drum and has been arranged with a belt tensioner.
- 6 Motor control is microprocessor controlled and can control the acceleration of the drum, its rpm and its retardation very precisely.

Motor control communicates with the program unit through a serial interface.

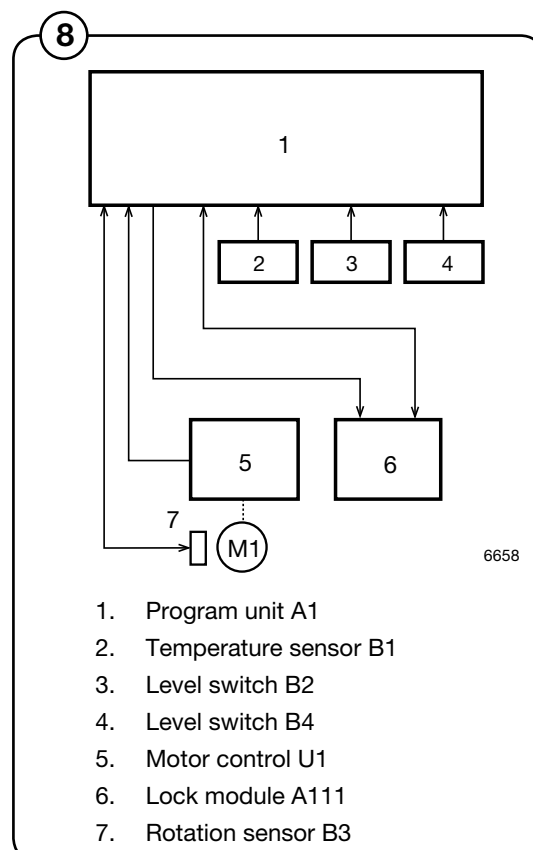
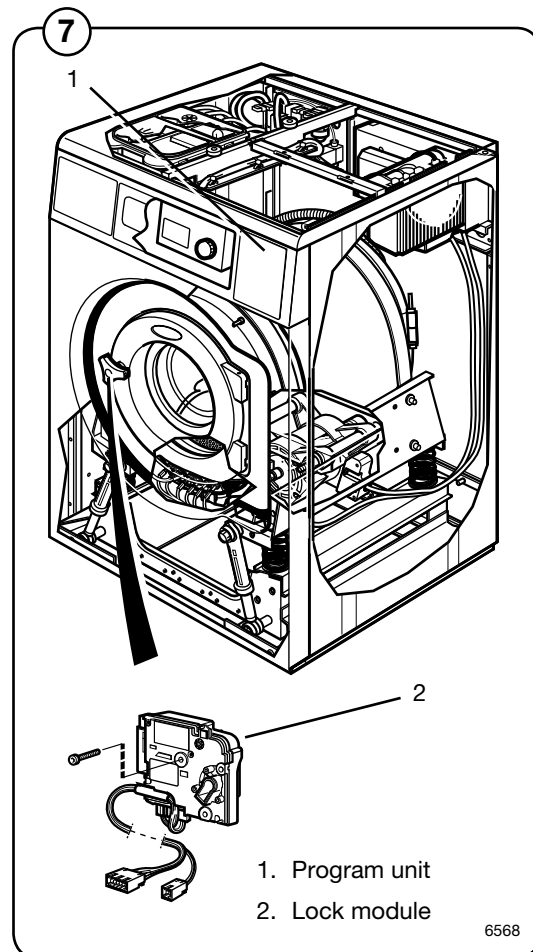
The machine's motor and motor control are described in more detail in the section **Motor**.



Door lock

- 7 The door lock is electromechanical with twin safety breakers. The lock is bi-stable, i.e. the lock must be given an active signal from the program unit to lock as well as unlock the door.
- 8 A separate circuit integrated in the program unit checks and controls the locking and unlocking of the door through a lock module. The circuit has separate controls that the drum is empty and that it is stationary. Through sensors in the lock module, the circuit checks the door's closed and locked position. Together with other controls the program unit conducts, this will guarantee the door cannot be opened by mistake.

The machine's door and door lock are described in more detail in the section **Door and door lock**.



Heating

- ⑨ Electric heating heats the washing water with three elements accessible from the front of the machine.

The machine's heating system is described more thoroughly in the section **Heating**.

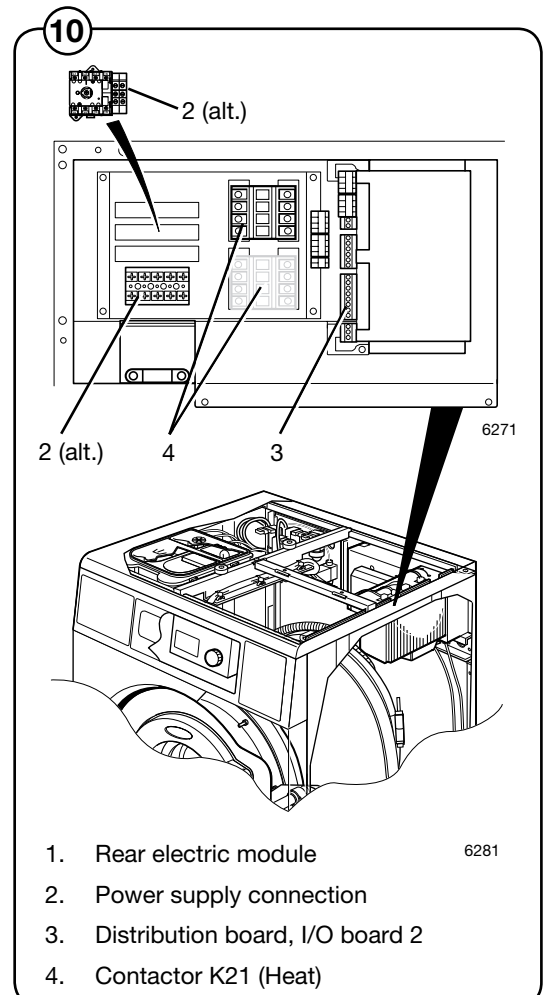
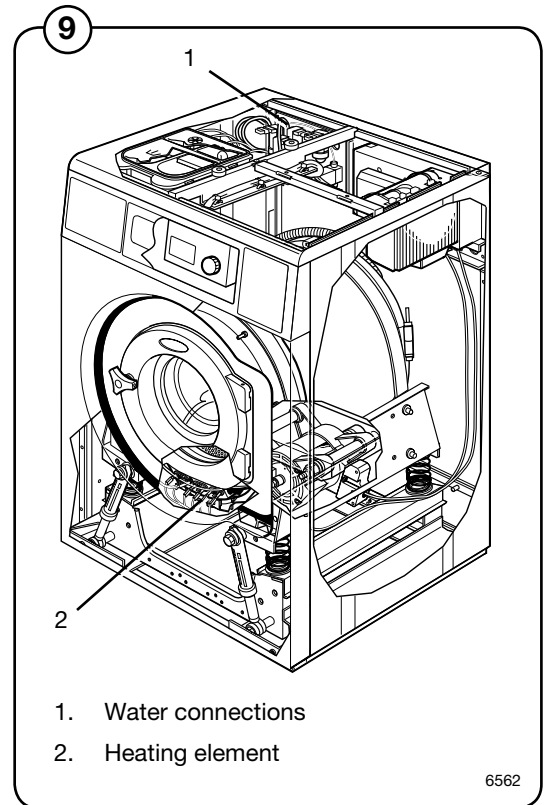
Water connections

- ⑨ The machine can have one, two, three or four water inlet valves depending on the machine size and customer requirements.

In this unit there are also eight connections for an external detergent feeder.

Rear electric module

- ⑩ Contains the main switch or terminal block for incoming power, heating contactor, I/O board with outputs for controlling the machine's water and drain valves and heating. Some machines have an additional I/O board with terminal blocks for connecting e.g. external detergent feeder.



Detergent compartment

- 11 The detergent compartment has four compartments for prewash, main wash, rinse and bleaching agent/liquid detergent.

The machine's detergent compartment is described more thoroughly in the section **Detergent compartment**.

Drain valve

- 11 The valve is a diaphragm valve that is opened and closed through water pressure. The control valve is mounted by the water valves.

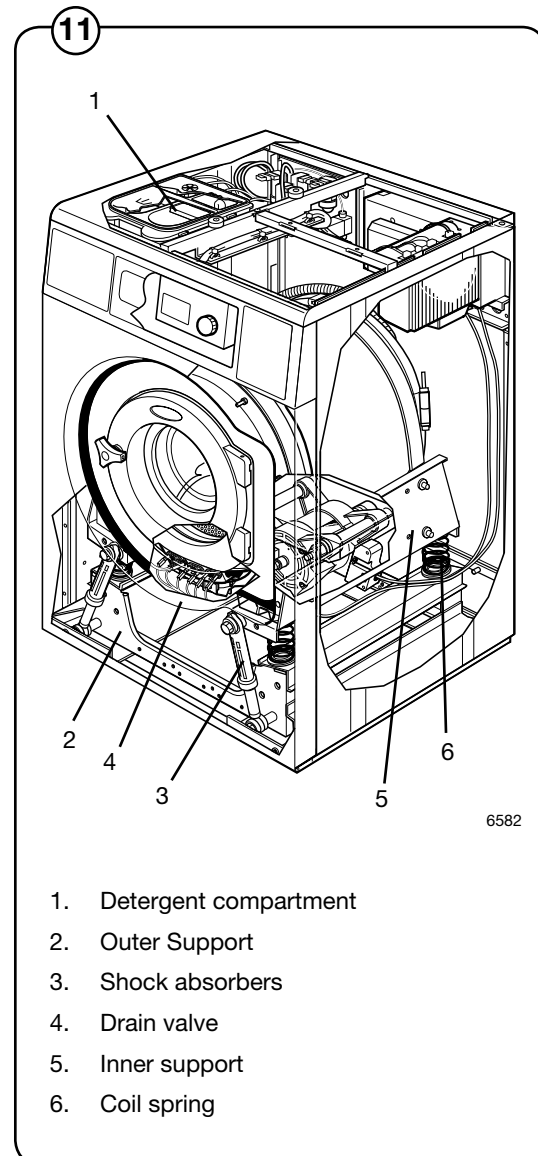
The machine's drain valve is described more thoroughly in the section **Drain valve**.

Frame and suspension

- 11 The machines are freely suspended, i.e. the drum package can move and is suspended in relation to the frame. In this way, a minimum of vibration passes to the bottom plate, which in turn simplifies installation as a concrete foundation is not required.

The machine has four shock absorbers between the bottom plate and the drum package.

The machine's frame is described more thoroughly in the section **Frame**.



Troubleshooting

This programming manual is intended for personnel with the authority to adjust parameters in the machine's existing wash programs, programming slot meters, reading statistics and configuring certain machine interfaces with the user. Programming is achieved using menus in the display while the machine is in service mode.

General information on troubleshooting

The troubleshooting section is used to trace faults in the machine to a defective component or unit.

There is a memory in the program unit that will save the selected program for approx. 3-5 minutes in the case of power cuts.

The machine will restart automatically if the power is turned on again within this time.

Safety regulations

Troubleshooting may only be carried out by authorised personnel.

Observe the safety regulations in chapter 1 before commencing troubleshooting.

Take care during all work on the machine while the power is on.



DANGER



Take care when measuring the motor control system since all components have a potential difference of approximately 300V in relation to protective earth and neutral.

The components will contain dangerous voltages when the green LED on the motor control board is on.

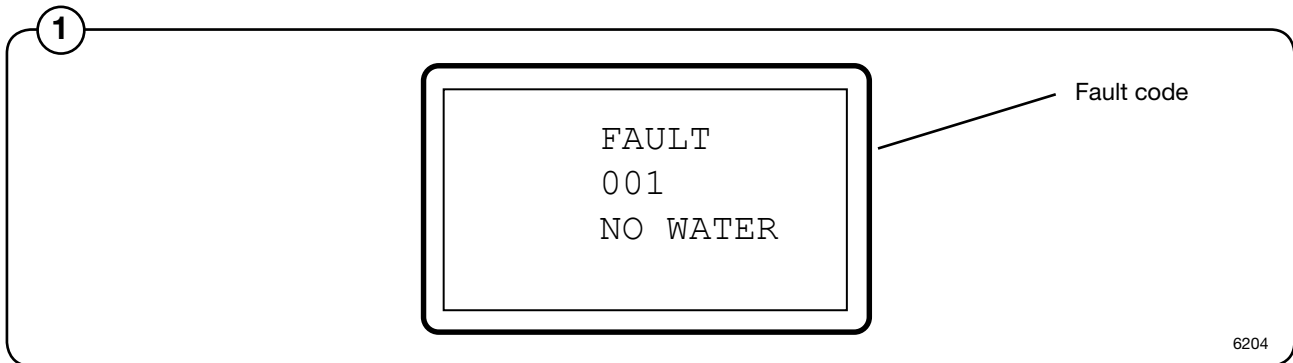
The motor control system will remain live for 30-60 seconds after cutting the power to the machine and the motor has stopped running.

Measurements

For information on measuring points, components and voltages, please refer to the relevant wiring diagram for the machine in question.

Faults with fault code

- ① A fault in the program or in the machine is indicated on the display by an error message comprising an error code and a descriptive text.



Fault code

The following is a brief description of all fault codes. The following pages describe fault codes, possible causes and corrective measures for each code.

Fault code	Text message
001	No water
002	Door open
003	Door lock fail
004	NTC low temp
005	NTC high temp
006	Water in machine
007	Overfilled
008	No heating
009*	Klixon
010	Drum not drained
011	Unb. on at prog. start

* In coin operated machine: Drum overfilled

Fault code	Text message
012	Program failure
013	No motor comm.
014	Level adjust.
015	Emergency stop
017	Door lock
018	Start not allowed
019	Master comm.
020	I/O MCU Interlock
021	I/O Communication
022	Oil
023	No I/O addressed
024	Checksum from DLCU
027	Level offset
028	CPU/DLCU low level
031	Heat sink too hot
032	Motor too hot
033	No interlock
035	Motor short circuit
036	Interlock hardware
037	Low DC voltage
038	High DC voltage
043	Unb. switch RDC/MCU on
044	Speed too high
045	Motor not follow
051	Checksum from CPU
052	Charge circuit
053	CPU/DLCU high levels
054	Tacho, no set signal
056	Set speed door open
058	Set signal no tacho
060	Actuator circuit
062	Water, door unlocked

Engaging servicemode

Service mode is engaged by using one of the following alternative:

- Alt. 1** Service switch on the CPU board under the top cover on the front of the machine.
- Alt. 2** Service switch on the I/O board at the rear of the machine to the right of the electrical connection.
- Alt. 3** Service switch on the CPU card will be activated via a link arm which can be accessed from the front below the top front panel. (On machines with coin counting only.)

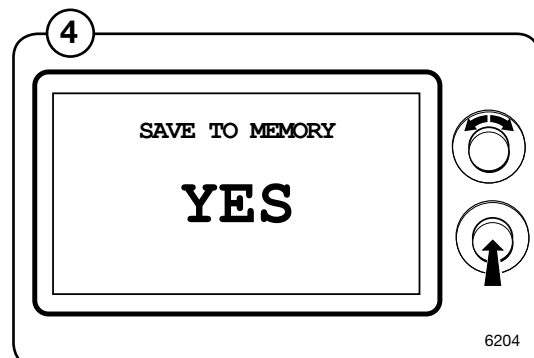
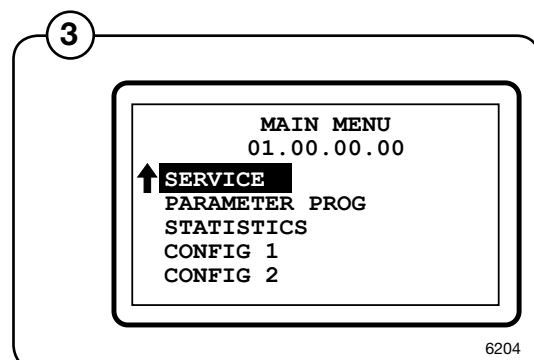
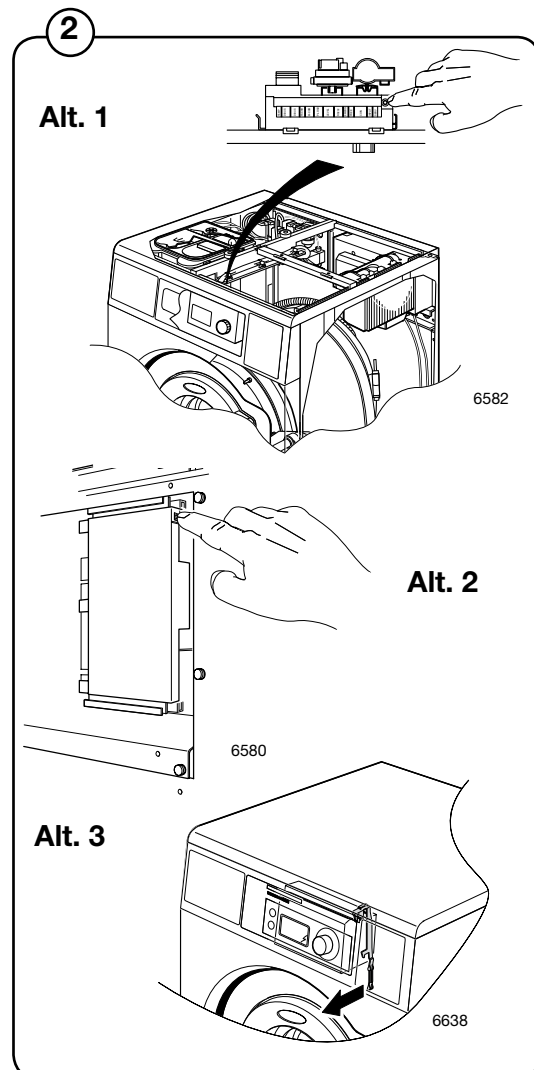
- 2 Press the service button about 2 sec.
- 3 The machine software will now switch to its service mode. The display lists the submenus available in this mode.

This service manual describes the functions and programming instructions for the following submenus:

- SERVICE
- CONFIG 1
- ACTIVATE WASH PROGR.
- I/O ADDRESS

For other submenus, please refer to the programming manual.

- 4 To save changes to the machine's flash memory, they must be confirmed in a menu that is displayed automatically whenever a change has been made and you are exiting the menu.



Description of fault codes and causes

Fault code 01, NO WATER

This fault code is generated by the programming CPU card.

When filling with water, the level specified by the wash program must be attained within a certain time. This time is normally set to 10 minutes but can vary depending on the type of machine and the software. If the filling time exceeds the maximum allowed filling time, fault code 01 will be displayed.

Long filling times can be caused by a blocked filler valve, defective filler valve, a break in the cable between the filler valve control board, defective valve control board, leaking level system, etc.

Fault code 02, DOOR OPEN

This fault code is generated by the programming CPU card. The fault code can only arise during an on-going wash program.

This fault code will be displayed if the input for closed door signals that the door has been opened during an on-going wash program.

This can be caused by a bad or defective door lock, loose cable to door lock, problem with door lock edge connection.

Fault code 03, DOOR LOCK FAIL

This fault code is generated by the programming CPU card. The fault code can arise at program start. If the door lock doesn't lock within a certain time after program start, this fault code will be shown.

This fault code will also be displayed if the door lock for closed door signals that the door has been unlocked during an on-going wash program.

This can be caused by a bad or defective door lock, loose cable to door lock, problem with door lock edge connection.

Fault code 04, NTC LOW TEMP

This fault code is generated by the programming CPU card. This fault code is displayed if the temperature around the NTC sensor is below approx. -9 degrees C.

A low temperature means the resistance in the sensor is too high, above approx. 23.7 kohm. This can be because the machine has been standing outdoors, an open circuit in the sensor, a break in the cable to the sensor, etc.

The resistance should be as shown in the table below:

Approximate values of a fault free temperature sensor

T (°C)	R (ohm)
19	6100
20	5850
21	5600
22	5350
23	5100

Fault code 05, NTC HIGH TEMP

This fault code is generated by the programming CPU card. This fault code is displayed if the temperature around the NTC sensor exceeds +98 degrees C.

A high temperature means the resistance in the sensor is too low, lower than approx. 350 ohm. This can be caused by a short circuit in the sensor, break in the cable to the sensor, etc.

Fault code 06, WATER IN MACHINE

This fault code is generated by the programming CPU board. This fault code may appear only in the case of rapid advance to the end of the program. The fault code will appear if the level system has not indicated "empty drum" within a certain time (approx. 3 min). This time may vary depending on the size of the machine.

Action:

- Check drain for dirt.
- Blow through the level hose and check that it is not blocked and does not contain any water.
- Check in the service program that the level control is working correctly.
- Adding too much detergent

Fault code 07, DRUM OVERFILLED

This fault code is generated by the programming CPU board. The fault code arises if the drum has been filled with water above a predetermined level during an on-going wash program. It can be caused by a blocked level hose, drops of water in the level tube, defective filler valve, defective electronic filler control, etc.

Action:

- Blow through the level hose and check that it is not blocked and does not contain any water.
- Check in the service program that the level control is working correctly.
- Check using the service program that all the water valves are working correctly.

Fault code 08, NO HEATING

This fault code is generated by the programming CPU board. The fault code means that the temperature is rising too slowly when heating is active. The limit for this fault code is normally set to a water temperature increase of approx. 3°C per 10 minutes but can vary depending on the type of machine and the software.

The fault code can be caused by a defective heater element, a break in the power supply to the heater element, defective heater contactor, etc.

Fault code 09, KLIXON

This fault code is generated by the programming CPU board. The fault code means that the temperature in the motor has been so high that the klixon breaker in the motor has been triggered. It can be caused by overloading the motor due to an overloaded drum, low rpm for long periods, defective klixon breaker in motor, short in cable between motor and CPU board, etc.

Fault code 09, DRUM OVERFILLED (only in coin operated machines)

This fault code is generated by the programming CPU card. The fault code is caused by the mechanical level control in the machine, by safety reason a doubled level system. The fault code arises if the drum has been filled with water above a level that normally should have generated fault code 07.

It can be caused by a blocked level hose, drops of water in the level tube, defective filler valve, defective electronic filler control, etc.

Action: see fault code 07.

Fault code 10, DRUM NOT DRAINED

This fault code is generated by the programming CPU card. The fault code arises if the water in the drum is not below a predetermined level when a drain period has been completed in the wash program. It can be caused by a blocked drain, blocked level hose, a water drop in the level hose, defective level control, restricted drain lines to the machine, too many machines emptying simultaneously into drain pipes that are too narrow, etc.

Action:

- First check the drain installation and that the waste water can flow freely out from the machine without any restrictions.
- Check the drain valve in the machine with regard to dirt.
- Blow through the level hose and check that it is not blocked and does not contain any water.
- Check in the service program that the level control is working correctly.

Fault code 11, UNB. ON AT PROG. START

This fault code is generated by the programming CPU board. The fault code means that the mechanical imbalance breaker is already active when the wash program starts. It can be caused by a defective imbalance breaker, mechanical problem making the imbalance breaker always active, short in the edge connection or cables, etc.

Fault code 12, PROGRAM FAILURE

This fault code is generated by the programming CPU board. This fault code means that one of the CPU board memories can be defective.

Action:

- Try reloading the software into the machine memory. If this does not help, the CPU board will have to be replaced.

Fault code 13, NO MOTOR COMM.

This fault code is generated by the programming CPU board. The fault code arises if the CPU board cannot communicate with motor control via the communication cable.

Actions:

- Check that there is power reaching the motor control.
- Then check that the indicator LED on the motor control is on. The LED can be seen by looking down by the motor control edge connections.
- Check also that the communication cable between the CPU board and the motor control is intact and not damaged. Measure also with a reference instrument to see whether there is contact between all the leads in the communication cable.

Fault code 14, LEVEL ADJUST

This fault code is generated by the programming CPU board. The fault code arises if the circuit board's internal level system has not been calibrated by the manufacturer.

Fault code 15, EMERGENCY STOP

This fault code is generated by the programming CPU board. The fault code arises if the emergency stop switch has been activated on the machine.

The cause can be inadvertent activation of the emergency stop, defective emergency stop switch, incorrect or shorted cable, etc.

Fault code 17, DOOR LOCK

This fault code is generated by the programming CPU card. The fault code arises if the door lock is locked at the start of the wash program, i.e. that the door is locked although the CPU board has not requested locking. This fault code will be shown if one try to start a program when the DLCU has given a fault code.

Fault code 18, START NOT ALLOWED

The machine's program unit has been disabled by a superior monitoring system.

Actions

- Get in touch with the supplier of the monitoring system for possible causes of the monitoring system disabling operation of the wash machine.
-

Fault code 19, MASTER COMM.

Communication with superior system has been broken. The cause can be a fault in the network connections, damaged cable, defective monitoring system, etc.

Action:

- Firstly, contact the supplier of the monitoring system for possible causes of the monitoring system not communicating.

Fault code 20, I/O MCU INTERLOCK

This fault code is generated by the programming CPU board. The program controller has read from the motor control or I/O board that the interlock is not active. The reason for interlock failure can be a problem with the hatch lock, damaged motor supply cables or the I/O board with interlock voltage etc. The most probable fault source is the I/O board.

Fault code 21, I/O COMMUNICATION

This fault code is generated by the programming CPU board. The program unit cannot communicate any longer with one or more I/O boards in the machine that it has communicated with before. The cause can be a problem with the machine's internal communication cables or that one or more I/O boards have lost their address.

Action:

- (Requires password) Check the machine's internal communication cables. Readdress all the I/O boards in the system using the service program if the cables are not at fault.

Note.

If only one I/O-card in machine, press the service button on the I/O-card about 10 seconds or until the LED goes out. Now I/O-card 1 will be addressed as No. 1.

Fault code 22, OIL

This fault code is generated by the programming CPU board. The fault code indicates low oil level in the oil reservoir for the oil lubrication. It can be caused by a lack of oil, defective sensor, shorted cable, etc.

Action:

- Fill with oil first. If this does not help, check sensor and cables.

Fault code 23, NO I/O ADDRESSED

The fault code means that there is no I/O board addressed in the system at all.

Action:

- (Requires password) Readdress the existing I/O board from the service menu.

Fault code 24, CHECKSUM FROM DLCU

This fault code is generated by the programming CPU board. The program unit has detected a fault in the internal communication in the DLCU-processor.

Action:

- Replace the CPU board.

Fault code 27, LEVEL OFFSET

This fault code is generated by the programming CPU board. The fault code arises if the level system indicates a level at the start of the wash program (when the drum should be empty) that exceeds what the program unit can compensate for automatically. This can be caused by blocked drain, blocked level hose, a drop of water in the level hose, leaking level system, defective level control, etc.

Action:

- Check drain for dirt.
- Blow through the level hose and check that it is not blocked and does not contain any water.
- Check in the service program that the level control is working correctly.

Fault code 28, CPU/DLCU LOW LEVELS

The DLCU contains a mechanical level monitor which ensures that there is no water in the machine when the lock opens. To ensure that the level monitor functions correctly, the mechanical level monitor is compared with a nominal value generated by the CPU, which is compared with the electronic level check.

When the water level exceeds the nominal value, a check is made to ensure that the mechanical level monitor is switched on, and if so, a fault code is generated.

Reason:

- The level controller can be damaged:
- Cross talk in the level controller electrical system.
- Leakage in the level controller's air hoses.
- Incorrect nominal value, possibly caused by a fault in the electronic level controller.

Action:

- Check the level controller function. (Switch-on level = 40 mm, switch-off level = 15 mm Wg)
- Check the cables and their connections. The voltage across the level controller should be 0 V when the water level is < 15 mm Wg and 5 V when water level is > 40 mm Wg.
- Check that the level hoses are not blocked. Blow clean all the hoses in the level system.

Fault code 31, HEAT SINK TOO HOT

This fault code is generated by the motor control. There is a temperature sensor (NTC) mounted on the motor control cooling flange next to the power transistors in the output stage. If the temperature of the cooling flange gets too high (> 90°C) the fault code will be set to protect the transistors.

The cause of high cooling flange temperature can be e.g. a stiff drum in combination with intensive use and high ambient temperature. There may also be a fault in the motor (sticking bearings or short circuit in windings, which impairs the efficiency of the motor). There may also be a fault in the motor control temperature measuring circuits.

Actions:

- Make sure the drum turns easily.
- Check the value on the fault code counter for fault code 31.
- Check the last 8 motor control fault codes.
- Start a 90°C normal program with load on continuous operation and measure the temperature of the motor and motor control.
- Replace the defective part.

Fault code 32, MOTOR TOO HOT

This fault code is generated by the motor control. Each time the motor is started from stationary, the motor control will first measure the resistance between two phases in the motor. The motor control processor governs the output transistors so that a determined DC current flows between two phases in the motor winding. The actuation of the transistors is a measure of the voltage applied to the winding and the resistance can be calculated using the current and voltage values. The resistance can then be converted to a temperature since the winding resistance at 20°C and the temperature coefficient are known. If the average value of the four latest temperature readings is higher than the maximum motor temperature (e.g. 130°C), the "Motor too hot" fault code will be activated.

The cause of high motor temperature can be a stiff drum, possibly in combination with intensive use and high ambient temperature. There may also be a fault in the motor (sticking bearings or short circuit in windings, which impairs the efficiency of the motor). There could also be a contact fault in the connectors between the motor control and the motor or a fault in the motor cable. A fault in motor control temperature measurement circuits can also occur.

Actions:

- Make sure the drum turns easily.
- Check the value on the fault code counter for fault code 32.
- Check the last 8 motor control fault codes.
- Measure the three phases to the phase resistors on the motor control motor connector (disconnect motor control and take the reading in the cable connector) to make sure they are the same.
- Start a 90°C normal program with load on continuous operation and measure the temperature of the motor and motor control.
- Replace the defective part.

Fault code 33, NO INTERLOCK

This fault code is generated by the motor control. The motor control must be powered with 230V/50 Hz on the interlock input in order to drive the motor. This signal is confirmation that the door is closed and locked. Motor control receives its commands to rotate the drum from the timer via a serial communication link between the motor control and timer. Since the timer also has access to the interlock signal, the timer must never send a run command to the motor control if the interlock signal is missing. If this does happen, the "No interlock" fault code will be activated.

The cause of this fault code being activated can be e.g. a break in the cable leading the interlock signal to the motor control. There may also be a fault in the connector in the door lock, which connects 230V/50Hz to the interlock signal. A fault in the interlock circuits of the motor control can also set this fault code.

Actions:

- Use a measuring instrument to check that the interlock signal comes on X302:1-2 when the door lock is activated. Read also bit 1 in the second byte under "Motor Status" in the service program (the bits are numbered from 0 to 7 where bit 0 is on the far right). If bit 1 in the second byte is 1 then the lock is open, while a 0 indicates that the lock is closed.
- Replace the defective part when it has been located.

Fault code 35, MOTOR SHORT CIRCUIT

This fault code is generated by the motor control. The motor control reads the power consumption of the motor continuously. If the current for some reason gets too high (= exceeds a certain limit), the motor control will cut the current to the motor. After the motor has stopped (= tachometer indicates stationary motor), the motor control will attempt to restart it. If the motor control then detects high motor current again, the "Short circuit motor" fault code will be activated. If on restarting after a first short circuit, the motor control rotates normally, a fault code will not be activated.

This fault code can be activated for a number of reasons:

- Short circuit in motor
- Short circuit internally in motor winding (impaired efficiency, higher current consumption)
- Short circuit in motor cables
- Short circuit in connectors
- Drops of water causing short circuits in the motor connector
- Short circuit in the motor control output transistors
- Bad contact in tacho signal
- Bad contact in interlock signal

Actions:

If the fault is a stable one, it is generally not difficult to locate the defective unit through resistance measurement and testing with the service program. Further information can be obtained by studying the contents of "MCU FAULT LOGGER". Study the following:

- SHORT CIRCUIT 2 (specifies how many times fault code 35 has been active)
- SHORT CIRCUIT 1 (specifies how many times the current limit has been exceeded. The difference between short circuit 1 and short circuit 2 indicates how many times there has been a short circuit 1 that has not been confirmed when restarting the motor).
- LAST FAULT CODE N/8 (shows the 8 latest fault codes)
- TACHO CUT-OUT LOW RPM (can give a clue in case of intermittent faults)
- TACHO CUT-OUT HIGH RPM (can give a clue in case of intermittent faults)

Fault code 36, INTERLOCK HARDWARE

This fault code is generated by the motor control. The motor control must be powered with 230V/50 Hz on the interlock input in order to drive the motor. The interlock circuits in the motor control have been split into two channels so that a component fault in motor control cannot give a false confirmation that the door is locked. These two channels are checked against each other. If this check gives an incorrect result, the "INTERLOCK HARDWARE" fault code will be activated.

The reason for this fault code being activated can be attributed to a fault in the interlock circuits in motor control.

Action:

- Replace motor control.

Fault code 37, LOW DC VOLTAGE

This fault code is generated by the motor control unit. The motor control unit constantly measures the voltage over the mains input. If the voltage is too low (= falls below a certain limit), the motor control unit will shut off the current to the motor. Once the motor has stopped (= the tachometer indicates that the motor is stationary), the motor control unit checks to see whether the input voltage is still low. If it is, a fault code is activated: "LOW DC VOLTAGE".

The reason for this fault code being activated can be low mains voltage or that the machine's on/off switch has been operated in an unsuitable manner. Further information can be obtained by studying the contents of "MCU FAULT LOGGER":

- UNDERVOLTAGE 2 (specifies how many times fault code 37 has been active)
- UNDERVOLTAGE 1 (specifies how many times the voltage has dropped below the limit. The difference between undervoltage 1 and undervoltage 2 indicates how many times there has been an undervoltage 1 without it being confirmed when the motor has stopped).
- LAST FAULT CODE N/8 (shows the 8 latest fault codes)

Undervoltages can be registered even during normal operation. Consequently, a small number of registrations need not mean that there is a fault in the motor control.

Measure:

- Check that the supply voltage is stable and never drops below nominal voltage - 10%.
- Check that the fuses and cables are not faulty.
- Check the supply voltage in the network cabling and at the motor control system in the machine.

Fault code 38, HIGH DC VOLTAGE

This fault code is generated by the motor control unit. The motor control unit constantly measures the voltage over the mains input. If the voltage is too high (= exceeds a certain limit), the motor control unit will shut off the current to the motor. Once the motor has stopped (= the tachometer sensor indicates that the motor is stationary), the motor control unit checks to see whether the input voltage is still high. If it is, a fault code is activated: "HIGH DC VOLTAGE".

The reason for this fault code being activated can be high mains voltage (e.g. power surge). Further information can be obtained by studying the contents of "FC FAULT LOGGER":

- OVERVOLTAGE 2 (specifies how many times fault code 38 has been active)
- OVERVOLTAGE 1 (specifies how many times the voltage limit has been exceeded. The difference between overvoltage 1 and overvoltage 2 gives the number of times overvoltage 1 has occurred without it being confirmed when the motor has stopped).
- LAST FAULT CODE N/8 (shows the 8 latest fault codes)

Overvoltage registrations can also occur if there is a bad contact in the tachometer signal. Check also the following registers:

- TACHO CUT-OUT LOW RPM (number of short tachometer interruptions during wash rpm)
- TACHO CUT-OUT HIGH RPM (number of short tachometer interruptions during extraction rpm)

Action:

- Check the tachometer cables if there are many registrations in the TACHO CUT-OUT registers.

Fault code 45, MOTOR NOT FOLLOW

This fault code is generated by the motor control. The motor control must always receive information on the rotation of the motor from the tachometer sensor in order to rotate. If the tachometer sensor is not working, the motor can rotate for max. 10 seconds during the starting process. After this period, the "MOTOR NOT FOLLOWING" fault code will be activated.

Reasons for this code being activated can be:

- Break in the cables between the tachometer sensor and the motor control
- Break in connectors in tachometer cables
- Break in one of the phases to the motor (cables or connectors). This fault can be suspected if the motor does not rotate for 10 seconds (the motor will not start with only two phases).
- Fault in tachometer generator
- Fault in tachometer circuits in the motor control

Further information can be obtained by studying the contents of "FC FAULT LOGGER". Study the following:

- MOTOR NOT FOLLOWING (specifies how many times fault code 45 has occurred)
- LAST FAULT CODE N/8 (shows the 8 latest fault codes)
- TACHOMETER CUT-OUT LOW RPM (can give a clue in case of intermittent faults)
- TACHOMETER CUT-OUT HIGH RPM (can give a clue in case of intermittent faults)

Action:

- Replace the defective part when troubleshooting is complete.

Fault code 51, CHECKSUM FROM CPU

DLCU has detected a fault in the internal communication between DLCU and CPU. The DLCU processor will reset itself when the fault has disappeared.

CPU reads the fault message when the program starts and finishes and generates a fault code, the fault message is ignored between these two occasions.

Reason:

Strong interference from surrounding equipment etc. can cause fault codes.

Action:

Re-set the fault codes. If the fault codes can not be re-generated or if they return, rectify the adjacent equipment that causes the interference. If this does not help, try changing the CPU board, since the interference sensitivity of different CPU boards can vary to some extent.

Fault code 52, CHARGE CIRCUIT

DLCU contains an arming circuit that is charged when the door lock coil is to be activated. For safety reasons, this arming circuit must be discharged when the door lock coil is not to be activated.

If the arming circuit for operating the door lock is charged when it is not supposed to be, a fault message will be sent to the CPU processor. If the fault ceases, the message will not be sent to the CPU.

CPU reads the fault message when the program starts and finishes and generates a fault code, the fault message is ignored between these two occasions.

Cause:

- The error can have been caused by overloads and/or defective components in the DLCU, or caused by defective components in the CPU.

Measure:

- If the error cannot be corrected, replace the CPU unit.
-

Fault code 53, CPU/DLCU HIGHLEVELS

The DLCU contains a mechanical level monitor which ensures that there is no water in the machine when the lock opens. To ensure that the level monitor functions correctly, the mechanical level monitor is compared with a nominal value generated by the CPU, which is compared with the electronic level check.

When a program starts or terminates, a check is made to ensure that the mechanical level monitor is switched off, and if this is not the case, a fault code is generated.

Reason:

- The level controller can be damaged:
- Open circuit in the cables for the level controller.
- Blocked air hoses in the level controller system.

Action:

- Check the level controller function. (Switch-on level = 40 mm, switch-off level = 15 mm Wg)
- Check the cables and their connections. The voltage across the level controller should be 0 V when the water level is < 15 mm Wg and 5 V when water level is > 40 mm Wg.
- Check that the level hoses are not blocked. Blow clean all the hoses in the level system.

Fault code 54, TACHO, NO SET SIGNAL

DLCU counts the tacho pulses from the motor in order to guarantee that the drum is stationary when the door is opened. To ensure that the signal from the tacho generator is working correctly, DLCU compares the tacho signal to a default value from the CPU processor, which is due to the CPU having activated the motor. The tacho signal should always correspond to the default value and if the tacho signal is present without the default value, a fault message will be generated to CPU.

The fault message is filtered in such a way that the drum must rotate and stop twice without the "should rotate" signal being present before a fault message is sent to CPU.

The DLCU processor will reset itself when the fault has disappeared.

CPU reads the fault message when the program finishes and generates a fault code, the fault message is ignored between these two occasions.

Reason:

The fault can be caused by cross talk in circuits in the CPU, or caused by damaged components in the CPU.

Action:

If the fault returns after a reset, change the CPU.

Fault code 56, SET SPEED DOOR OPEN

DLCU counts the tacho pulses from the motor in order to guarantee that the drum is stationary when the door is opened. To ensure that the signal from the tacho generator is working correctly, DLCU compares the tacho signal to a default value from the CPU processor, which is due to the CPU having activated the motor.

If the default value is on when the door lock is unlocked, a fault message will be sent to CPU.

The DLCU processor will reset itself when the fault has disappeared.

CPU reads the fault message when the program finishes and generates a fault code, the fault message is ignored between these two occasions.

Reason:

The fault can be caused by cross talk in circuits in the CPU, or caused by damaged components in the CPU.

Action:

If the fault returns after a reset, change the CPU.

Fault code 58, SET SIGNAL NO TACHO

DLCU counts the tacho pulses from the motor in order to guarantee that the drum is stationary when the door is opened. To ensure that the signal from the tacho generator is working correctly, DLCU compares the tacho signal to a default value from the CPU processor, which is due to the CPU having activated the motor. The tacho signal should always correspond to the default value and if the tacho signal is not present when the default value is present, a fault message will be generated to CPU.

The fault message is filtered in such a way that the default value should have been on for 2 seconds; if this is the case, a check is made that the pulses from the tacho sensor are present when the default value ceases.

The DLCU processor will reset itself when the fault has disappeared.

CPU reads the fault message when the program finishes and generates a fault code, the fault message is ignored between these two occasions.

Reason:

- The fault can be caused by breaks in the circuits for the tacho sensor, or caused by a fault in the magnet in the tacho sensor.
- Collateral damage due to a fault in the motor system.

Action:

- If there is no fault in the tacho sensor or the motor system, and the fault returns after a reset, change the CPU.

Fault code 60, ACTUATOR CIRCUIT

The DLCU processor controls the door lock actuator coil. The DLCU processor checks continuously that the coil is engaged. DLCU can detect a break in the circuit ($>50 \text{ kohm}$) (DLCU cannot detect a short in the circuit). If there is a break in the actuator circuit, CPU will be notified; the fault message will disappear if the fault ceases.

CPU reads the fault message when the program starts and finishes and generates a fault code, the fault message is ignored between these two occasions.

Reason:

- The fault can be caused by a break in the cables between the hatch lock and the CPU, or caused by a fault in the hatch lock solenoid.
- Fault or break in the CPU circuits.

Action:

- If the fault returns after a reset, and is not caused by a fault in the hatch lock or the cables for the hatch lock, change the CPU.

Program unit

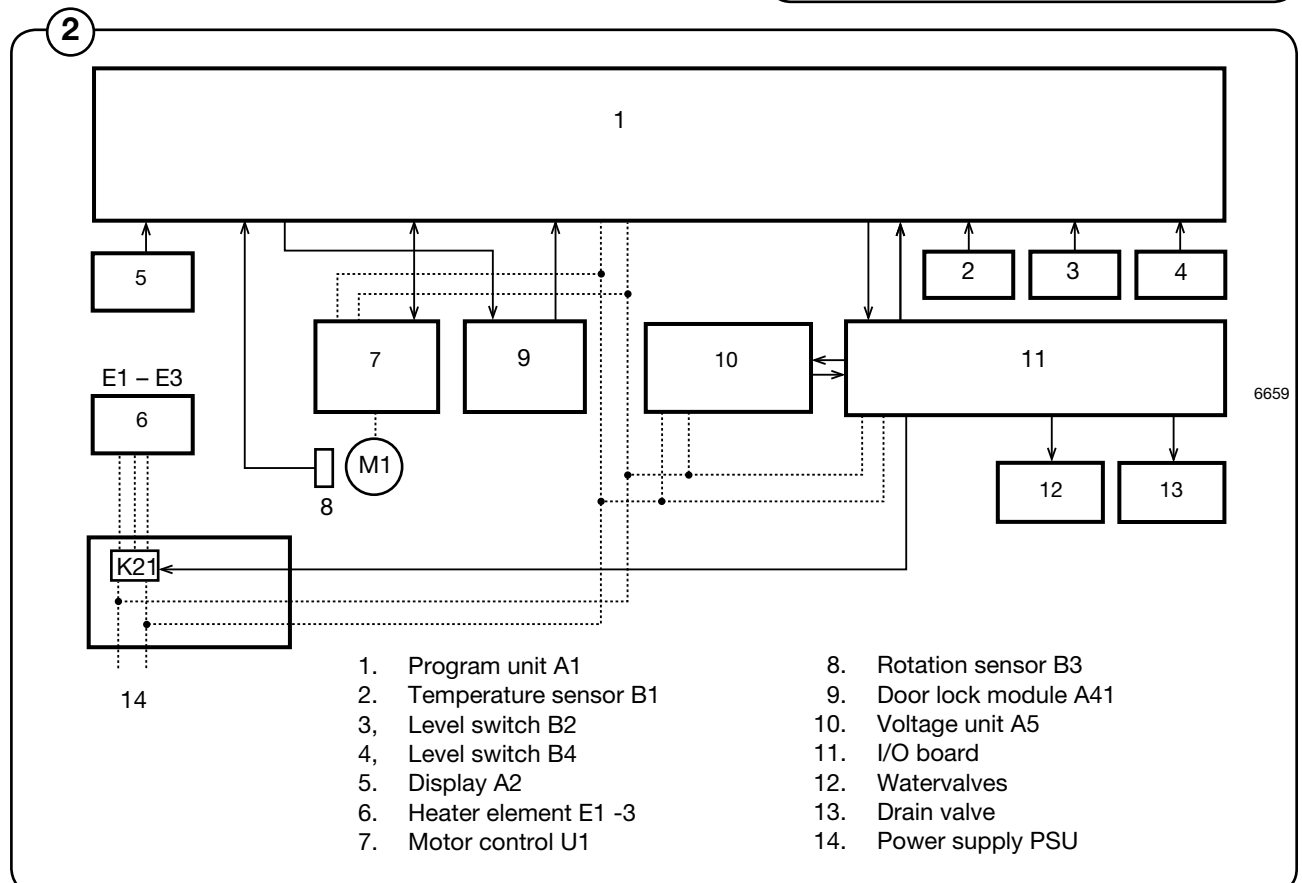
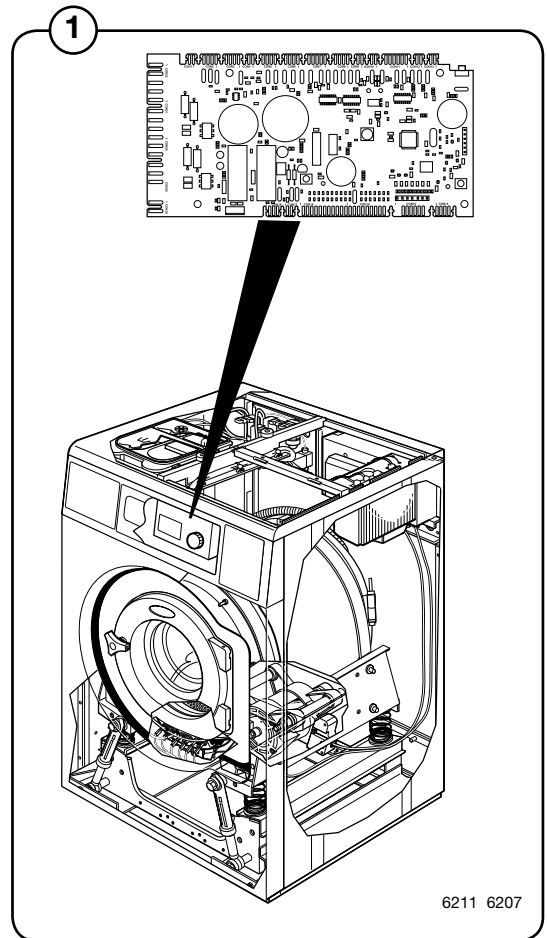
Description

General Information

- ① The program unit is electronic and comprises a circuit board containing microprocessor, program memory, current regulating circuits, temperature and level control, etc.
- ② The program unit receives its power from a separate voltage unit.

The program unit receives information from the temperature sensor, door lock and level switches. There is also a serial interface to the motor control.

The program unit controls the water and drain valves and the heating via the I/O board, door closing/opening via a drum module and the motor via the motor control.

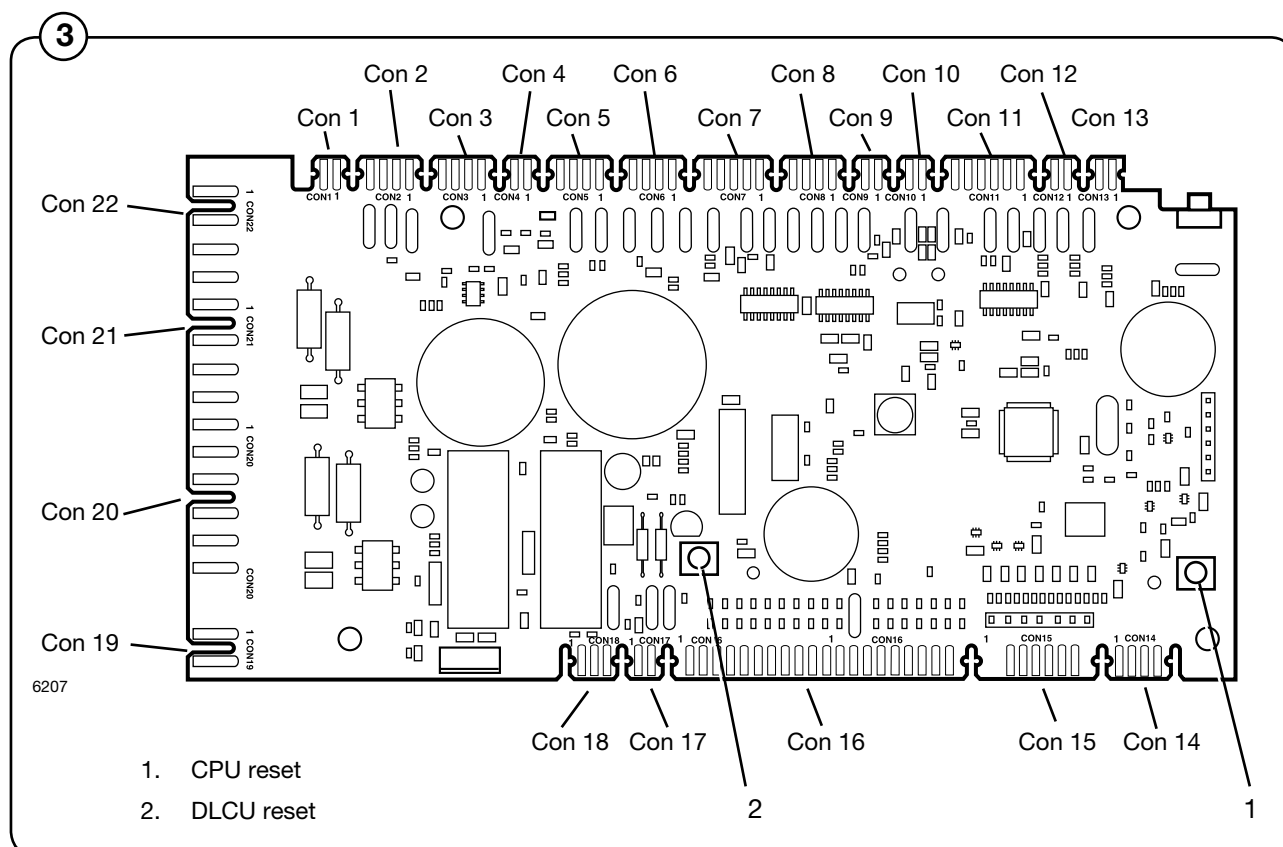


Program unit

Inputs and outputs

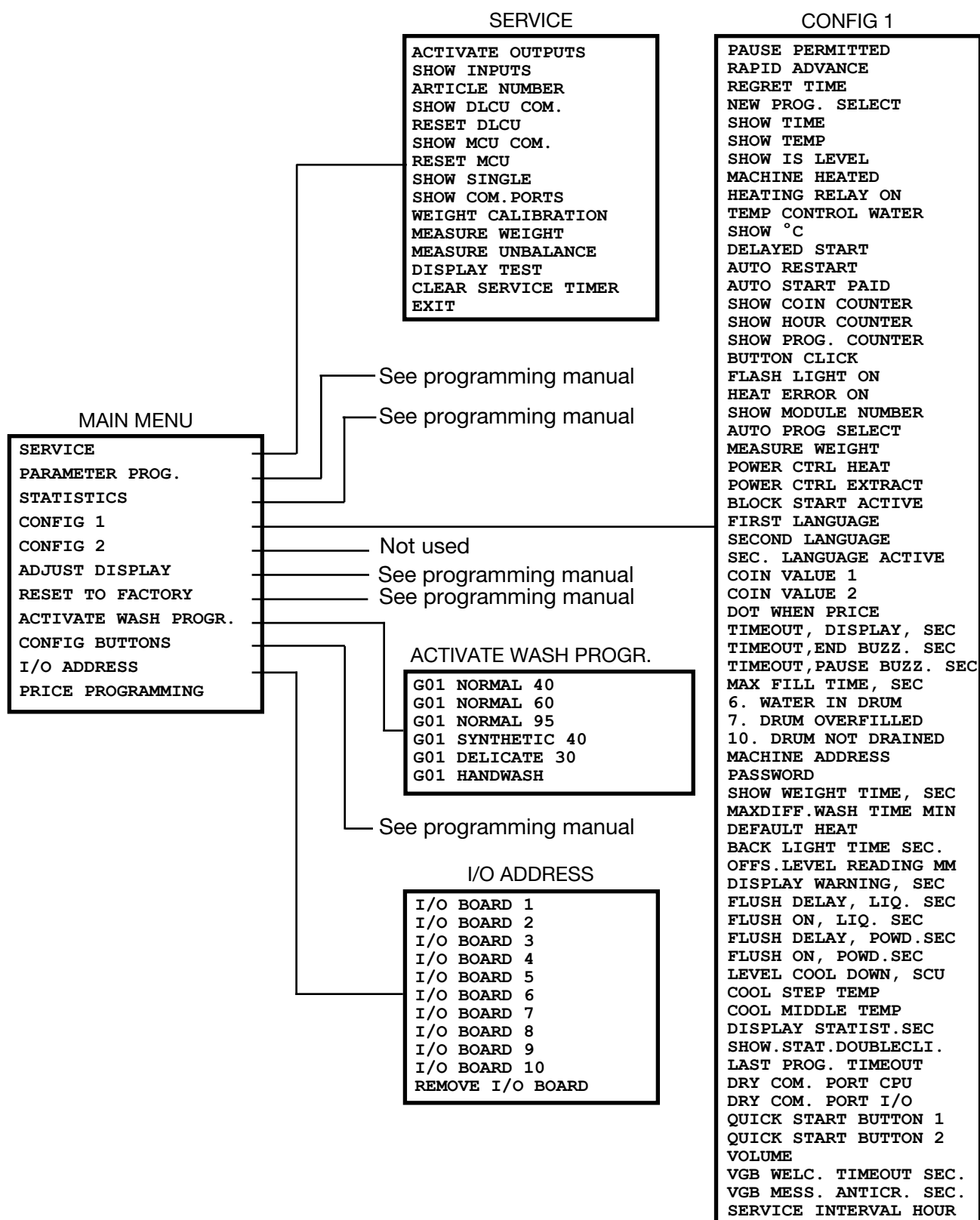
- ③ The program unit board has the following inputs and outputs:

Board connector	Function
Con 1	Input from temperature sensor (Temp)
Con 2	Databus (D-bus)
Con 3	Databus (D-bus)
Con 4	Tacho
Con 5	Communication, motor control unit (M-com)
Con 6	Connection for software/service download (P-load)
Con 7	Input, Level sensors (level)
Con 8	Serial communication (RS 232)
Con 9	Input, Emergency stop (EMERG)
Con 10	Input, Free wash (key switch) (FREE W)
Con 11	Input, Coin meter (coin)
Con 12	Input, function depending on model (INPUT)
Con 13	Service button in rear electrical module (SERV)
Con 14	Control knob, pulses
Con 15	Control knob, switch
Con 16	Display
Con 17	Input, Buzzer
Con 18	Counter input
Con 19	Door, out (DO)
Con 20	Door, in (DOOR IOut)
Con 21	Mains voltage bus (PBUS)
Con 22	Mains voltage bus (PBUS)



Menu tree

The machine software is constructed with menus that are structured according to the menu tree below. The menus become available when the machine is in service mode, see under the heading "Engaging service mode".



Engaging servicemode

Service mode is engaged by using one of the following alternative:

Alt. 1 Service switch on the CPU board under the top cover on the front of the machine.

Alt. 2 Service switch on the I/O board at the rear of the machine to the right of the electrical connection.

Alt. 3 Service switch on the CPU card will be activated via a link arm which can be accessed from the front below the top front panel. (On machines with coin counting only.)

④ Press the service switch for about 2 seconds.

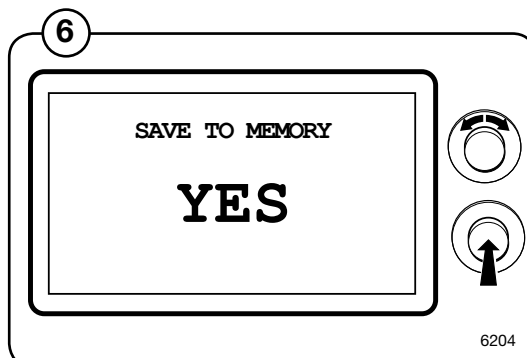
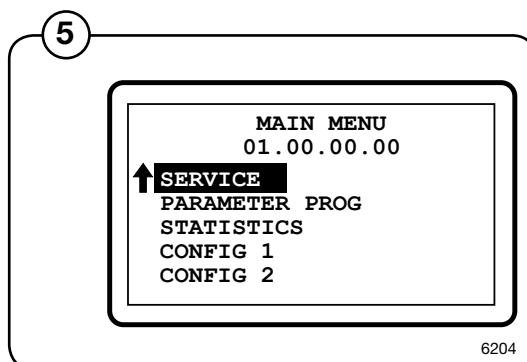
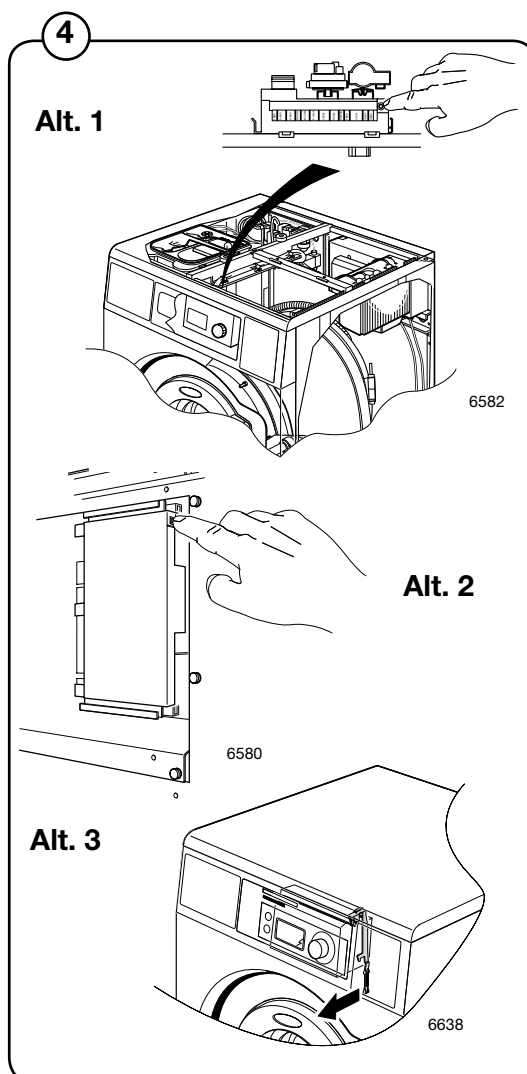
⑤ The machine software will now switch to its service mode. The display lists the submenus available in this mode.

This service manual describes the functions and programming instructions for the following submenus:

- SERVICE
- CONFIG 1
- ACTIVATE WASH PROGR.
- I/O ADDRESS

For other submenus, please refer to the programming manual.

⑥ To save changes to the machine's flash memory, they must be confirmed in a menu that is displayed automatically whenever a change has been made and you are exiting the menu.



Service program

The service program is used to facilitate troubleshooting the machine. Using this program you can:

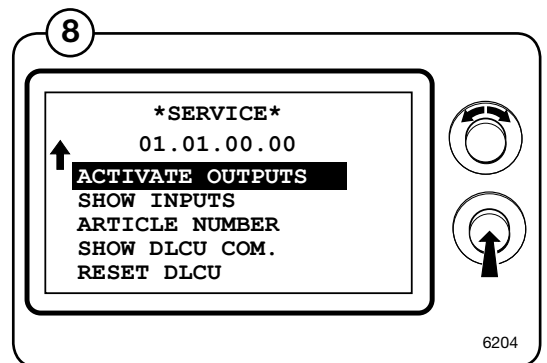
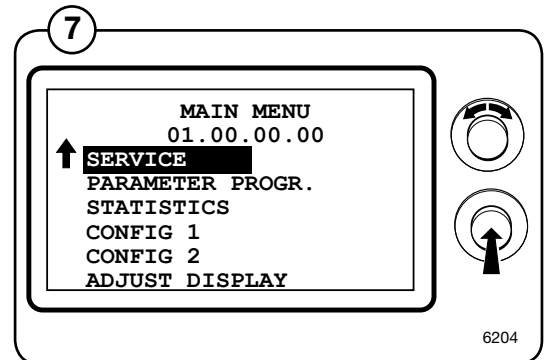
- control the machine functions individually
- check the sensor signals to the CPU
- check the communication in the machine control system
- calibrate the weighing function
- weigh and measure unbalance
- check the display

- 7 Engage service mode, mark the SERVICE row in the main menu and press the knob.

The display will now show the different submenus in the service program.

- 8
- ACTIVATE OUTPUTS
 - SHOW INPUTS
 - ARTICLE NUMBER
 - SHOW DLCU COM.
 - RESET DLCU
 - SHOW MCU COM.
 - RESET MCU
 - SHOW SINGLE
 - SHOW COM.PORTS
 - WEIGHT CALIBRATION
 - MEASURE WEIGHT
 - MEASURE UNBALANCE
 - DISPLAY TEST

Select the desired menu and press the knob.



ACTIVATE OUTPUTS

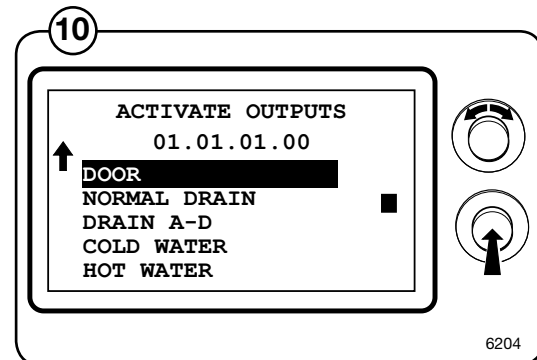
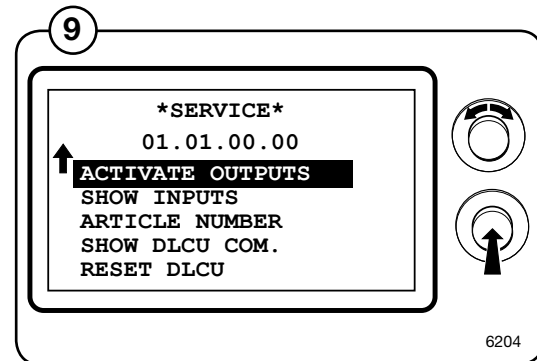
- 9 Select the ACTIVATE OUTPUTS row and press the knob.

The display now shows the functions (outputs) that can be activated.

- DOOR
- NORMAL DRAIN
- DRAIN A-D
- COLD WATER
- HOT WATER
- HARD WATER
- TANK 1-4 WATER
- HEAT 1
- HEAT 2
- HEAT 3
- POWDER DETERGENT
- LIQUID DETERGENT
- INTERLOCK MOTOR
- PROGRAM RUN
- MACHINE FREE
- DRUM CW
- DRUM CCW
- DISTRIBUTION
- LOW EXTRACT
- MEDIUM EXTRACT
- HIGH EXTRACT
- TURBO EXTRACT
- CLUTCH
- START CAP. RELAY
- BUZZER
- FLASH LIGHT
- OIL PULSE
- SLOT BLOCKING
- LCD BACK LIGHT ON

- 10 Select the desired function and press the knob.

Several outputs can be activated simultaneously. An activated output is indicated by a filled box to the right.

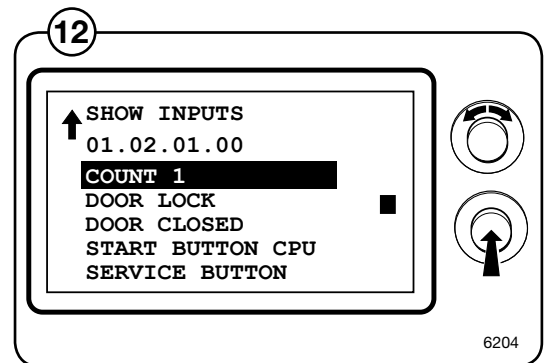
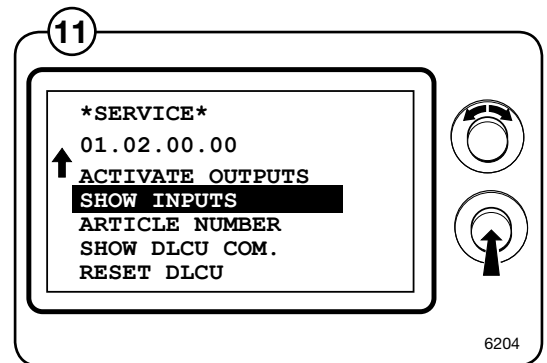


SHOW INPUTS

- 11 Select the SHOW INPUTS row and press the knob. The display now shows the sensor signals (inputs) that can be activated.

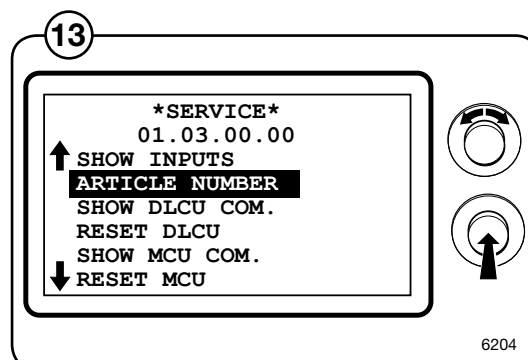
- 12
- COUNT 1
 - DOOR LOCK
 - DOOR CLOSED
 - START BUTTON CPU
 - SERVICE BUTTON
 - PRICE PROGRAMMING
 - PRICE REDUCTION
 - FREE WASH
 - COIN 1
 - COIN 2
 - EMERGENCY STOP
 - ALTER. HEAT RELAY
 - START/STOP
 - TEMPORARILY PAUSE
 - BLOCK START BUTTON
 - DRUM OVERFILLED
 - PC5
 - TEMPERATURE PAUSE
 - TANK 1 EMPTY
 - TANK 2 EMPTY
 - TANK 3 EMPTY
 - TANK 4 EMPTY
 - OIL EMPTY
 - TEMPERATURE
 - LEVEL A/D SCU
 - LEVEL SCU
 - LEVEL MM
 - TEMPERATURE DISP
 - DRUM SPEED RPM
 - TACHO SIGNAL
 - LIQUID TANK EMPTY
 - QUICK START 1
 - QUICK START 2
 - UNBALANCE
 - BUTTON I/O 1
 - INTERLOCK I/O 1
 - BUTTON I/O 2
 - INTERLOCK I/O 2
 - BUTTON I/O 3
 - INTERLOCK I/O 3
 - BUTTON I/O 4
 - INTERLOCK I/O 4
 - BUTTON I/O 5
 - INTERLOCK I/O 5
 - BUTTON I/O 6
 - INTERLOCK I/O 6
 - BUTTON I/O 7
 - INTERLOCK I/O 7
 - BUTTON I/O 8
 - INTERLOCK I/O 8
 - BUTTON I/O 9
 - INTERLOCK I/O 9
 - BUTTON I/O 10
 - INTERLOCK I/O 10
 - RAPID ADVANCE
 - SERVICE 2 INPUT

Several inputs can be activated simultaneously. An activated input is indicated by a filled box to the right.



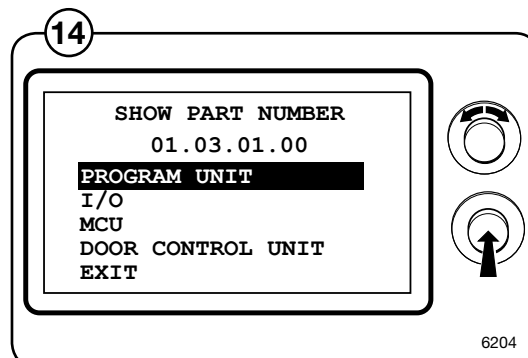
ARTICLE NUMBER

- 13 Select the ARTICLE NUMBER row and press the knob. You can now choose on the display to show the article numbers for the program units, I/O boards, motor control or DLCU fitted in the machine. Select the unit for which to show the article number.
- 14



SHOW DLCU COM.

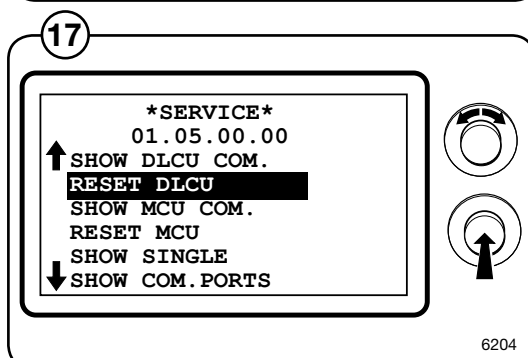
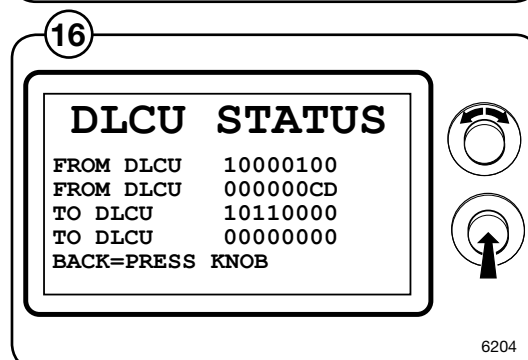
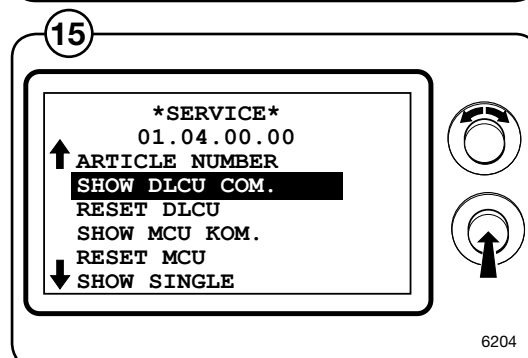
- 15 Select the SHOW DLCU COM. row and press the knob. The display shows the status of the communication to and from the DLCU board.
- 16 For detailed information, please contact your supplier.



RESET DLCU

- 17 Reset DLCU from the fault code by selecting the RESET DLCU row and pressing the knob. The reset will take a few seconds.

The square which lights up to the right of the menu bar indicates that there is a fault code in the DLCU (Door lock control unit).



SHOW MCU COM.

- 18 Select the SHOW MCU COM. row and press the knob.
- 19 The display shows the status of the communication to and from the frequency control.

RESET MCU

- 20 Reset frequency control from the fault code by selecting the RESET MCU row and pressing the knob. The reset will take a few seconds.

The square which lights up to the right of the menu bar indicates that there is a fault code in the DLCU (Door lock control unit).

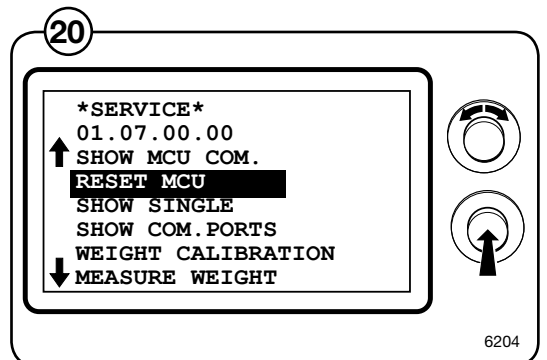
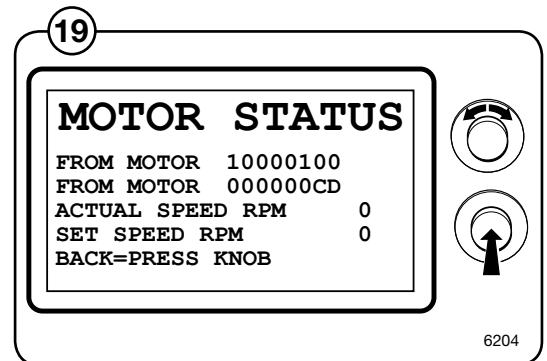
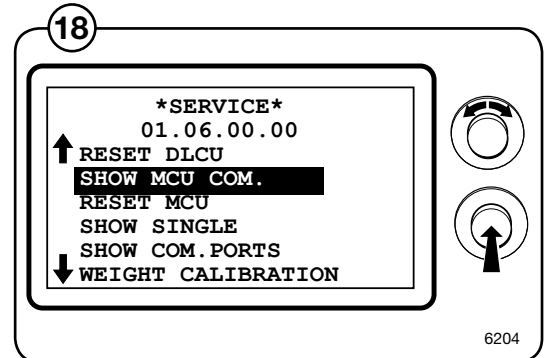
SHOW SINGLE

Select the SHOW SINGLE row and press the knob. The display shows the status of the communication to and from the slot meter.

For detailed information, please contact your supplier.

SHOW COM. PORTS

Select the SHOW COM. PORTS row and press the knob. Possible communication ports are shown in the display. Select a port, then press the knob to test that port. Note that the ports "send" and "receive" must be strapped for the test to work.



WEIGHT CALIBRATION

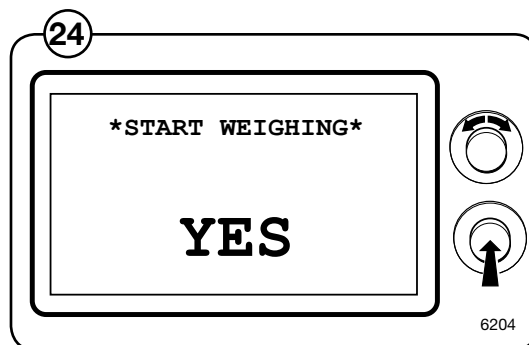
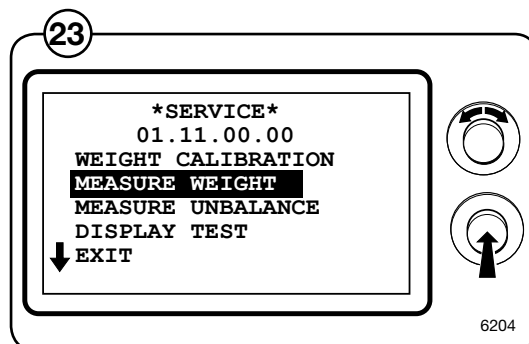
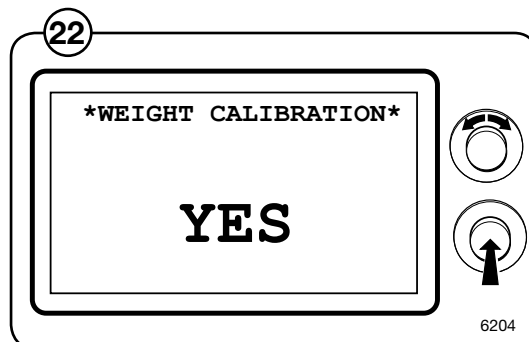
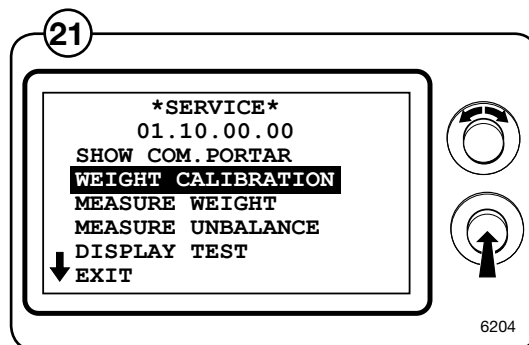
- 21 Select the WEIGHT CALIBRATION row and press the knob.
- Operate the machine with an empty drum.
 - After weight calibration, the weight deviation will be shown in a hexadecimal format on the bottom line of the display.
 - The drum will go faster and slower a number of times during weight calibration. This is normal. Weight calibration will take a few minutes.
 - When exiting weight calibration after it is complete, you will have the option of saving the calibration value.
 - The value for 0 calibration is taken on each washing occasion and the weight value is adjusted automatically for any deviations.

NB!**The drum must be empty during calibration.**

- 22 Confirm that calibration is to be performed with YES or return to the previous menu with NO.

MEASURE WEIGHT

- 23 Select the MEASURE WEIGHT row and press the knob.
- 24 Put in a known weight. The same weight must be shown in the display once the weight has been measured.
- Confirm that measurement is to be performed with YES or return to the previous menu with NO.
- This function is used to check that the machine is weighing correctly.



MEASURE UNBALANCE

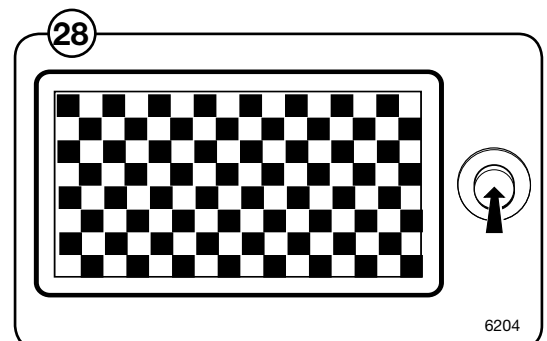
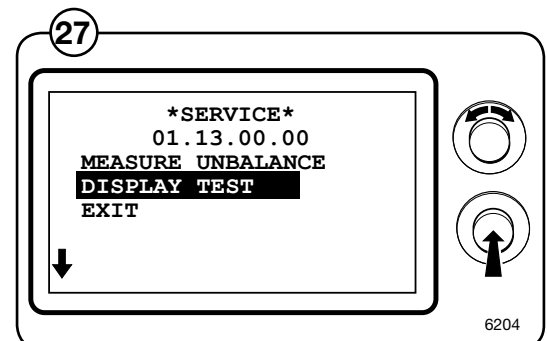
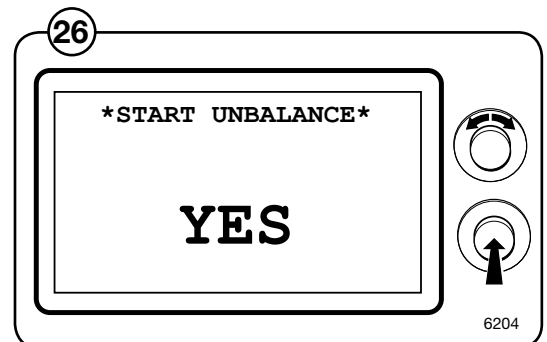
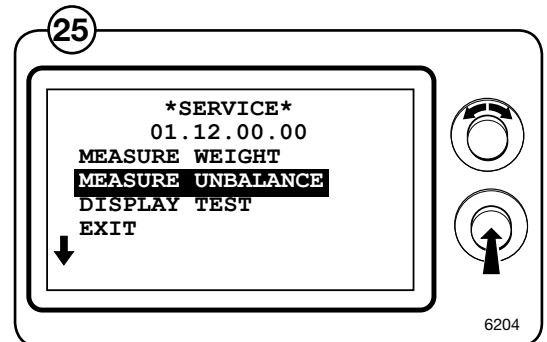
- 25 Select the MEASURE UNBALANCE row and press the knob.
- 26 Put in a known unbalance weight. A corresponding weight must be shown in the display once imbalance measurement has taken place.

Confirm that measurement is to be performed with YES or return to the previous menu with NO.

This function is used to check that the machine is measuring unbalance correctly.

DISPLAY TEST

- 27 Select the DISPLAY TEST row and press the knob.
- 28 The display shows a grid for checking that all the segments in the display are intact. By turning the control knob, two different grids and a completely black and a completely blank page are shown. Press the knob to return to the previous menu.



Config 1

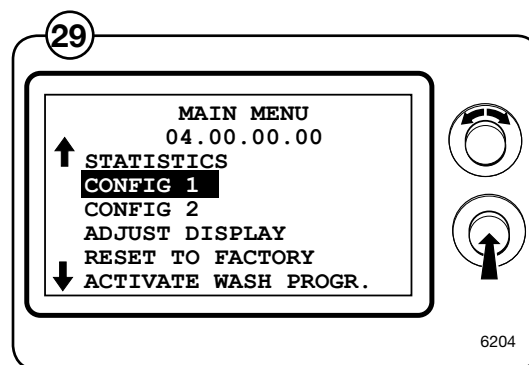
The configuration 1 menu contains all the functions and parameters that service personnel can change without a password.

Engage the machine's service mode.

- 29 Select the CONFIG 1 row in the main menu and press the knob.

All the available parameters will now be displayed. The table below gives the default value on the right.

• PAUSE PERMITTED	YES
• RAPID ADVANCE	YES
• REGRET TIME	YES
• NEW PROG. SELECT	YES
• SHOW TIME	YES
• SHOW TEMP	YES
• SHOW IS LEVEL	NO
• MACHINE HEATED	YES
• HEATING RELAY ON	YES
• TEMP CONTROL WATER	YES
• SHOW °C	YES
• DELAYED START	YES
• AUTO RESTART	YES
• AUTO START PAID	NO
• SHOW COIN COUNTER	NO
• SHOW HOUR COUNTER	NO
• SHOW PROG. COUNTER	NO
• BUTTON CLICK	YES
• FLASH LIGHT ON	NO
• HEAT ERROR ON	YES
• SHOW MODULE NUMBER	NO
• AUTO PROG SELECT	NO
• MEASURE WEIGHT	YES
• POWER CTRL HEAT	NO
• POWER CTRL EXTRACT	NO
• BLOCK START ACTIVE	NO
• FIRST LANGUAGE	ENGLISH
• SECOND LANGUAGE	
• SEC. LANGUAGE ACTIVE	120
• COIN VALUE 1	0000
• COIN VALUE 2	0000
• DOT WHEN PRICE	
• TIMEOUT, DISPLAY, SEC	600
• TIMEOUT,END BUZZ. SEC	30



• TIMEOUT, PAUSE BUZZ. SEC	10
• MAX FILL TIME, SEC	600
• 6. WATER IN DRUM	YES
• 7. DRUM OVERFILLED	YES
• 10. DRUM NOT DRAINED	YES
• MACHINE ADDRESS	0000
• PASSWORD	0000
• SHOW WEIGHT TIME, SEC	30
• MAXDIFF. WASH TIME MIN	10
• DEFAULT HEAT	YES
• BACK LIGHT TIME SEC.	0000
• OFFS. LEVEL READING MM	0000
• DISPLAY WARNING, SEC	0000
• FLUSH DELAY, LIQ. SEC	0000
• FLUSH ON, LIQ. SEC	0000
• FLUSH DELAY, POWD. SEC	0000
• FLUSH ON, POWD. SEC	0000
• LEVEL COOL DOWN, SCU	
• COOL STEP TEMP	
• COOL MIDDLE TEMP	
• DISPLAY STATIST. SEC.	0000
• SHOW STAT. DOUBLECLI.	0030
• LAST PROG. TIMEOUT	
• DRY COM. PORT CPU	
• DRY COM. PORT I/O	
• QUICK START BUTTON 1	
• QUICK START BUTTON 2	
• VOLUME	
• VGB WELC. TIMEOUT SEC.	0000
• VGB MESS. ANTICR. SEC.	0000
• SERVICE INTERVAL HOUR	0000

30 Select the desired function/parameter and press the knob.

31 To engage and disengage functions, turn the knob to select YES or NO and then press the knob.

32 To adjust the value, set the value and press the knob. The arrow in each menu shows the column to be adjusted.

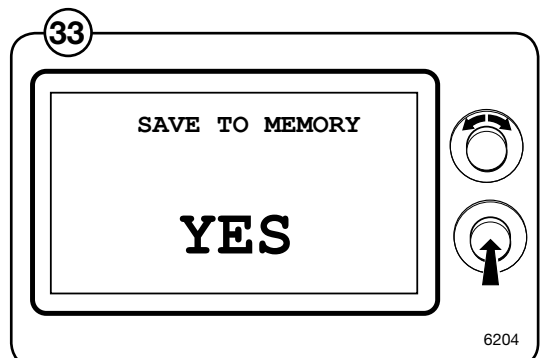
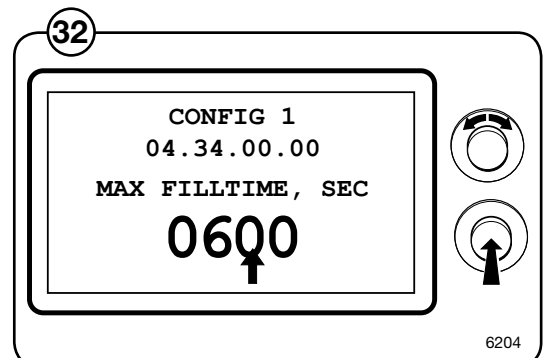
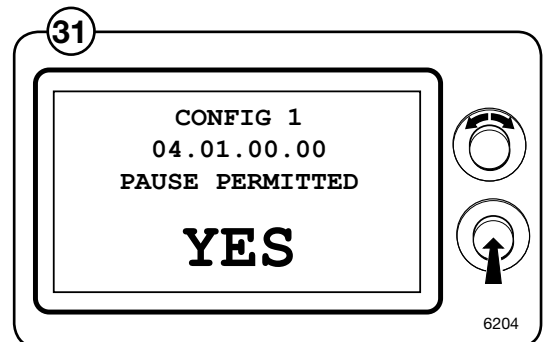
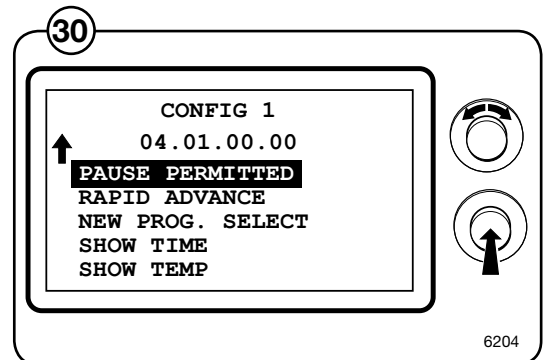
- Turn the knob clockwise to set the desired number between 0 and 9.
- Turn the knob anticlockwise to move to the next column. Turn the knob clockwise and set the value, etc.
- Once all the columns have been set, press the knob to confirm and go back to the config menu 1.

When all the relevant values have been adjusted, select EXIT and press the knob.

33 Confirm the changes (write to memory YES/NO) and return to the main menu.

Note!

All changes will be executed only after exiting the CONFIG 1 menu.



PAUSE PERMITTED

Select whether it should be possible to pause during an on-going wash program.

Yes = A pause is allowed during a wash program.

No = A pause is not allowed during a wash program.

RAPID ADVANCE

Select whether it should be possible to step rapidly forward or backward through the wash program while it is in progress.

Yes = It is allowed to step rapidly through a wash program.

No = It is not allowed to step rapidly through a wash program. Rapid advance can be used on all machines during the first five minutes after a program has been started, even if you have answered NO.

REGRET TIME

Indicate using the knob how long coins inserted should “remain” in memory after the start of the programme.

Also actuates the functions PAUSE, RAPID ADVANCE and NEW PROGRAMME SELECTION

NEW PROG. SELECT

Select whether to allow switching to another wash program while one is in progress without first stepping rapidly through to the end of the current program before switching. Will only work if PAUSE is allowed.

Yes = Switching to a new wash program is allowed.

No = Switching to a new wash program is **not** allowed.

SHOW TIME

Select whether the calculated remaining program time is to be shown on the display window while the program is in progress. This will require the program having been used at least once or the row will be blank even if you respond with Yes.

The time shown is based on a calculation model using an input value from the previous wash program.

Yes = The calculated time remaining of the program is shown on the display window while a wash program is in progress.

No = No time is displayed in the display window.

SHOW TEMP

Select whether the current water temperature is to be shown on the display window while a wash program is in progress. This function cannot be shown on the display at the same time as the SHOW IS LEVEL function, only one of the functions can be shown at one time.

Yes = The water temperature is shown.

No = No temperature is displayed in the display window.

SHOW IS LEVEL

Select whether the current water level is to be shown on the display window while a wash program is in progress. The level is shown in divisions. This function cannot be shown on the display at the same time as the SHOW TEMP function, only one of the functions can be shown at one time.

Yes = The water level is shown. (replaces temperature display in display window)

No = No level is displayed in the display window.

MACHINE HEATED

Select whether the machine is to wait until a programmed temperature has been attained before the wash time starts being counted.

Yes = The programmed temperature must be attained

No = The washing time is counted down as soon as the washing module has been started.

HEATING RELAY ON

Select whether the heating contactor should activate or not when the heating starts.

Yes = The heating contactor will cut in when the heating starts. This is the normal process for heated machines.

Note!

The heating contactor will also cut in on machines that are configured as unheated, if YES has been answered for this configuration.

No = The heating contactor will not cut in. Used on unheated machines that are fitted with heating contactors (machine changed from heated to unheated).

TEMP CONTROL WATER

Select whether the machine is to control and adjust the water temperature by opening and closing the main valves for hot and cold water during filling.

Yes = Control of main valves during filling.

- Alt.1: Hot and cold water valves both open. If the set water temperature is exceeded, the hot water valve will be shut automatically.
- Alt. 2: Only hot water valve open. If the set water temperature is exceeded, the cold water valve opens automatically together with the hot water valve.

No = No temperature control. The hot and cold water valves are both open until the correct level has been attained.

SHOW °C

Select whether all the temperature values are to be displayed in °C or °F

Yes = All temperature values displayed in °C.

No = All temperature values displayed in °F.

DELAYED START

Select whether there should be the possibility of setting a delay from when the start button is pressed until the machine is to start.

Yes = Time for delayed start can be set. Delayed start is available as a separate menu bar in the start menu, where you can select the delay in hours and minutes.

No = The delayed start function is disengaged.

AUTO RESTART

Select whether there should be the possibility of setting the machine for automatic restart. Automatic restart is available as a separate menu in the start menu, where the number of automatic restarts of the selected wash programme can be selected by the user.

Yes = Number of automatic restarts can be set.

No = The delayed start function is disengaged.

AUTO START PAID

Select whether the machine is to be able to start automatically, when full price has been paid, for the chosen wash program.

Yes = Automatic start engaged.

Note!

If the signal for blocking the start button is engaged, it also applies to the blocking signal for the automatic starting function.

No = The automatic start function is disengaged.

SHOW COIN COUNTER

Select whether the contents of the machine's coin counter should be shown in the display window while a wash program is in progress or outside the wash program without going into service mode. The counter is shown on the display after pressing the control knob twice in quick succession.

Yes = The contents of the coin counter can be displayed if a time has been set for the function SHOW.STAT.DOUBLECLI.

No = No display of the contents in the coin counter.

SHOW HOUR COUNTER

Select whether the contents of the machine's hour counter should be shown in the display window while a wash program is in progress or outside the wash program without going into service mode. The counter is shown on the display after pressing the control knob twice in quick succession.

Yes = The contents of the hour counter can be displayed if a time has been set for the function SHOW.STAT.DOUBLECLI.

No = No display of the contents in the hour counter.

SHOW PROG. COUNTER

Select whether the contents of the machine's counter of completed wash programs should be shown in the display window while a wash program is in progress or outside the wash program without going into service mode. The counter is shown on the display after pressing the control knob twice in quick succession.

Yes = The contents of the program counter can be displayed if a time has been set for the function SHOW.STAT.DOUBLECLI.

No = No display of the contents in the counter.

BUTTON CLICK

Select whether the machine should give a sound for each new position when the knob is turned and pressed in.

Yes = Sound.

No = No sound.

FLASH LIGHT ON

Select whether the output for the flash light is to be activated while the buzzer is activated during a wash program. The output is on all the time and becomes inactive when the buzzer is turned off.

Yes = Flash function on.

No = Flash function off.

HEAT ERROR ON

Select whether the HEAT ON fault code should be displayed when the machine is heating up too slowly.

Yes = The fault code is displayed.

No = The fault code **is not shown**.

SHOW MODULE NUMBER

Select whether the washing module number should be shown while a wash program is being used.

The washing module number will always be shown during rapid advance, however.

Yes = The module number is displayed.

No = The module number is not shown.

AUTO PROG SELECT

Choose whether wash programme 1 should be selected automatically and displayed in start position as soon as the door is opened/closed or coins are inserted in the coin slot.

Yes = Automatic programme selection takes place.

No = Automatic programme selection off

MEASURE WEIGHT

Select whether the count weight function should be activated. Note that the function cannot be activated for wash programs that are programmed for no weight count.

Yes = Count weight activated.

No = Count weight **not** activated.

POWER CTRL HEAT

Select whether the power priority function (PC5) for heating should be engaged. For connecting and setting PC5, please refer to separate instructions.

Yes = Power priority (PC5) engaged.

No = Power priority (PC5) **not** engaged.

POWER CTRL EXTRACT

Select whether the power priority function (PC5) for extraction should be engaged. For connecting and setting PC5, please refer to separate instructions.

Yes = Power priority (PC5) engaged.

No = Power priority (PC5) **not** engaged.

BLOCK START ACTIVE

Select whether it should be possible to block the start of the wash program with the control knob via a separate input.

Yes = Wash program start can be blocked.

No = The wash program start **cannot** be blocked.

FIRST LANGUAGE

Select the language to be shown when the machine is started. The program unit will return to the language set here if the machine is not used during the period specified in the LANGUAGE TIMEOUT menu.

COIN VALUE 1 and 2

Specify with the knob the value (0 999) for the respective coin slot.

For example: Coin 1, 1 = 1 EURO
Coin 2, 5 = 5 EURO

Coin 1, 50 = 50 Cent
Coin 2, 100 = 1 EURO

Setting the price to 300 and selecting COLON
WHEN PRICE will display the price as 3:00.

DOT WHEN PRICE

On machines with coin counter, the price can be displayed with or without dot (0:00 or 000).

Yes = The dot is displayed.

No = The dot is not displayed.

TIMEOUT, DISPLAY, SEC

Specify with the knob the time after which the machine should reset a program selection that has not started. The time is given in steps of 10 seconds; 0 - 2550 seconds.

TIMEOUT,END BUZZ. SEC

Specify with the knob the time during which the buzzer should sound at the end of the program unless the buzzer is turned off manually. The time is given in seconds; 0 - 255.

TIMEOUT,PAUS BUZZ. SEC

Specify with the knob the time during which the buzzer should sound for a pause unless the pause is interrupted manually. The time is given in seconds; 0 - 255.

MAX FILL TIME, SEC

Specify with the knob the maximum time (in seconds, 0 - 2550) it should take to fill the machine with water to the programmed level.

If the water has not reached the correct level within the set time, the "NO WATER" fault message will appear on the display.

MACHINE ADDRESS

Specify with the knob the machine's address (0 - 127) that is used when the machine is connected to the CMIS system.

PASSWORD

Select whether the functions under CONFIG 1 should be password protected or not.

The password comprises four numerals. The code 0000 means no password is required for the CONFIG 1 menu.

The password code can be changed or removed at any time.

SHOW WEIGHT TIME, SEC

Used for machines with weight count. Once weighing has been carried out, the weight obtained is displayed over the specified time.

MAXDIFF.WASH TIME MIN

Specify with the knob the maximum time deviation for the total time of the wash program. If this is exceeded in comparison with the total time when the same wash program was last used, the stored total time shall only be adjusted with the limit time. Note that this applies to both positive and negative time.

The time is given in minutes; 0 - 20

DEFAULT HEAT

Select whether the machine should be heated with steam (heating contactors 1/2) or electricity (heating contactor 3) as the default heating system.

Yes = Electricity.

No = Steam.

BACK LIGHT TIME SEC.

Specify how long in seconds that the display lighting should be on without the control knob being activated. The value 0000 means that the lighting is on all the time.

OFFS.LEVEL READING MM

The value set is subtracted from the ACTUAL value in mm in order to compensate for the distance between the level recess and the bottom of the inner drum. Once this has been set, the water level above the bottom of the inner drum, etc. can be read.

DISPLAY WARNING, SEC

Specify with the knob the number of seconds the warnings are to be displayed. Warnings are e.g. empty tank alarm from detergent that is shown each time a wash program is displayed.

The time is given in steps of 1 second in the range 0 -255 seconds.

FLUSH DELAY, LIQ. SEC

Delay time for flushing of detergent once dosing of liquid detergent is complete.

The time is given in steps of 1 second in the range 0 -255 seconds.

FLUSH ON, LIQ. SEC

Rinse times for rinsing detergent after the drum has been filled with water.

The time is given in steps of 1 second in the range 0 -255 seconds.

FLUSH DELAY, POWD.SEC

Delay for rinsing detergent after the drum has been filled with water.

The time is given in steps of 1 second in the range 0 -255 seconds.

FLUSH ON, POWD.SEC

Rinse times for rinsing detergent after the drum has been filled with water.

The time is given in steps of 1 second in the range 0 -255 seconds.

LEVEL COOL DOWN, SCU

Select the level to which the machine should be filled with the cold water valve if the wash program includes the rapid cooling function.

The level is given in divisions (DIV) in the range 0 - 850.

COOL STEP TEMP

Specify the maximum drop in temperature allowed per minute during cooling. During cooling, the temperature will be monitored so that the average drop in temperature from the starting temperature down to the specified intermediate temperature does not exceed the given value.

The temperature is given in steps of one degree in the range 0 - 100 °C.

COOL MIDDLE TEMP

Specify the temperature at which the cooling function should stop monitoring that the drop in temperature during cooling is not going too fast.

The temperature is given in steps of one degree in the range 0 -100 °C.

DISPLAY STATIST.SEC.

Indicate using the knob how long the statistics for COINS – HOUR COUNTER – PROGRAM COUNTER are to be displayed when the power to the machine is switched on. The time is given in steps of 1 second in the range 0 -255 seconds.

SHOW.STAT.DOUBLECLI.

Indicate using the knob how long the statistics for COINS – HOUR COUNTER– PROGRAM COUNTER are to be displayed following rapidly pressing the knob twice. The time is given in steps of 1 second in the range 0 -255 seconds

Activate wash progr.

The ACTIVATE WASH PROGR. menu is used to specify the wash programs in the program library that are to be made available to the user and in which order the wash programs are to be presented in the display.

- 34 Engage service mode and select the ACTIVATE WASH PROGR. row in the main menu. Press in the knob.
- 35 All the wash programs contained in the installed program library are now shown.

NORMAL

SYNTHETIC

DELICATE

HANDWASH

WOOL

EXTRACTION

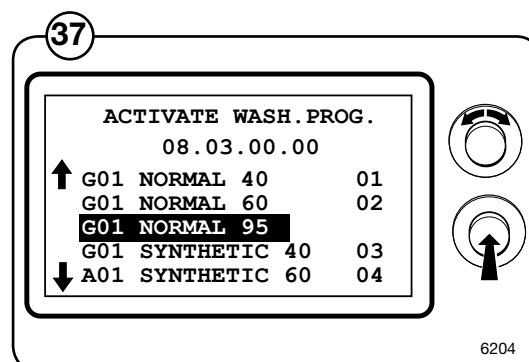
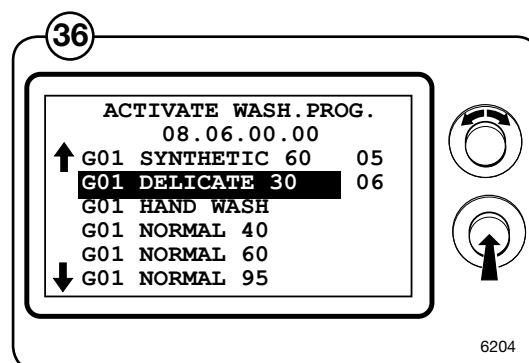
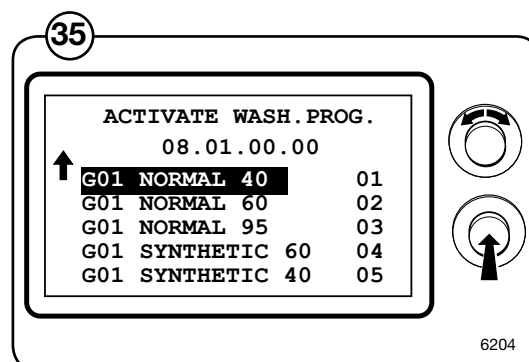
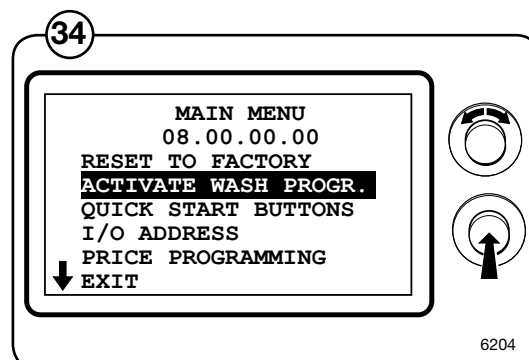
The activated wash program is presented in the program selection menu. At the end of each row these wash programs are numbered in the order they are presented in the program selection menu.

Add (activate) a wash program

- 36 Select the wash program to be activated and press the knob. The selected wash program is assigned the number after the last activated program, i.e. the selected program will be presented last in the program selection menu.

Remove (deactivate) a wash program

- 37 Select the wash program to be removed and press the knob. The selected wash program is deactivated and renumbering will take place automatically for the remaining programs in the list.



Unbalance detection

When the drum in a drain sequence starts its acceleration from wash rpm to distribution rpm, the extreme unbalance measurement will start once about 90% of the distribution rpm has been attained. Subsequently, during the entire remaining super unbalance measurement, the distribution time and during the entire subsequent extraction time, the program unit will detect whether there is any extreme unbalance.

In case of extreme unbalance that can arise if e.g. a spring strut is defective or when washing in sacks, the acceleration will be stopped to wait for the drum to stop. If extreme unbalance arises during:

- a. distribution or during super unbalance measurement, the drain sequence will restart from the beginning. The number of restart attempts can be changed in the system data but is usually set to 5. The value can also be changed via configuration 2.
- b. extraction, the program will stop and move to the wash sequence after extraction.

I/O modules

General

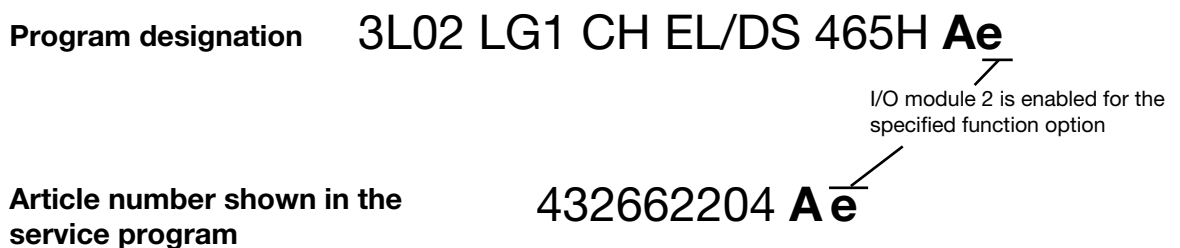
Washing machines may be equipped with either one or two I/O modules:

- I/O module 1 controls internal machine functions and is always installed in the machine prior to delivery. It controls outputs to water valves, waste discharge and heating.
- I/O module 2 is installed as an optional extra, controlling the external functions of the machine, i.e. inputs from payment and booking systems and outputs to detergent pumps.

The functionality of I/O module inputs and outputs is dependant on the parameter software downloaded to the machine's program device. The function options for the I/O modules are indicated by a letter in the program designation for each module and, together with the article number of the parameter software, shown in the ARTICLE NUMBER menu of the service program as per the following example:



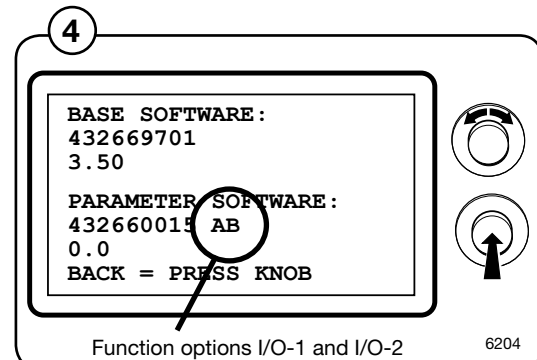
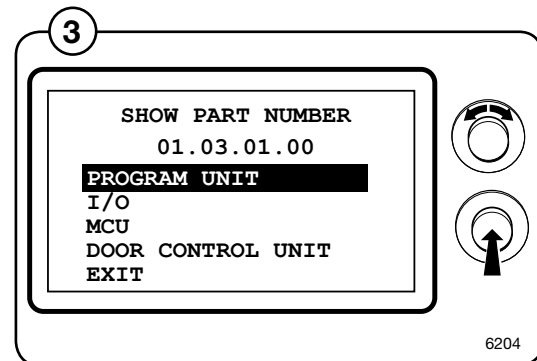
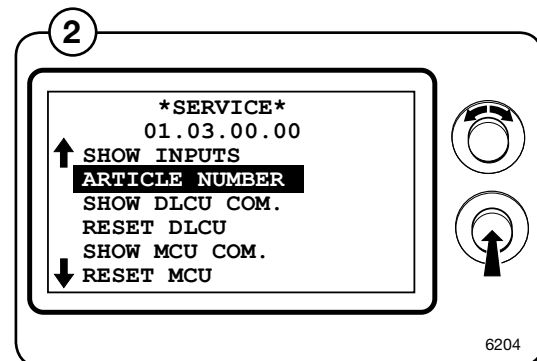
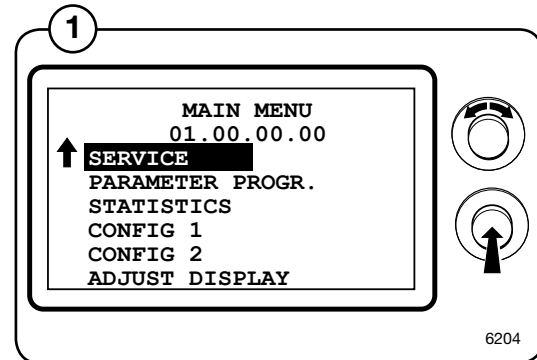
If the second letter (I/O module 2) appears in lower case, it means that the machine is not fitted with I/O module 2 but the downloaded parameter software is I/O module 2 enabled.



If the machine subsequently fitted with I/O module 2, the module will acquire the function option as specified by the second letter once the new I/O module has been addressed.

Function options via the service program

- ① Engage service mode, highlight the SERVICE line in the main menu and press the knob.
The display will now show the different submenus in the service program.
- ② Highlight the ARTICLE NUMBER line and press the knob. You can now choose to view the article numbers of program devices, I/O modules, motor control or DLCUs installed in the machine.
- ③ Highlight the PROGRAM DEVICE line and press the knob.
- ④ Read the program article number under PARAMETER SOFTWARE. The letters at the end of the article number indicate the function options of the I/O modules in the current program; for more information, refer to the General and Function Options sections in the documentation for each I/O module.



Function options via program designation

- ⑤ The parameter software installed in a machine's program device on delivery is specified on 2 plates, one located on the inside of the door and one by the machine's electrical connection.

Using this article number, you can find the program designation and thereby identify I/O module function options in one of the following ways:

Option 1.

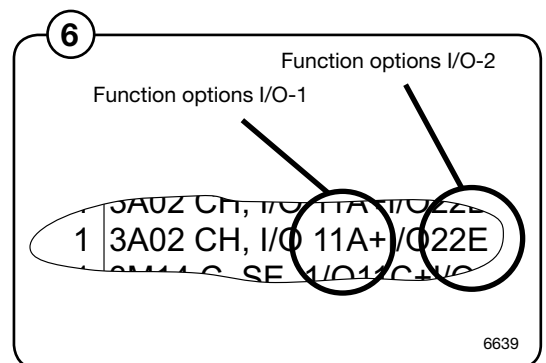
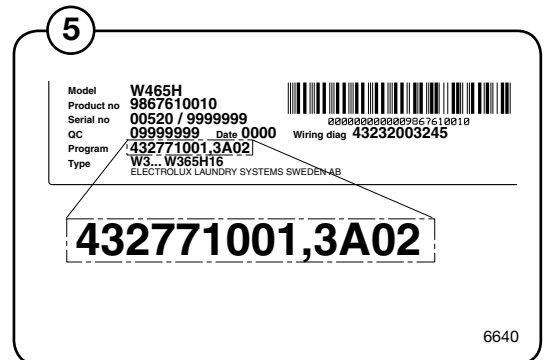
Access the spare parts list under "Program Device".

- ⑥ The program designation and the I/O module function options are specified in the remarks column for the relevant parameter software article number.

Option 2.

Open the "Compass Control Loader – Existing software" CD and select the relevant machine.

- ⑦ The program designation and the I/O module function options are specified for the relevant parameter software article number.



⑦

MACHINE PROGRAM	PART NO	REVISION	TYPE	HEATING	WATER
W455H	3A02	432660002	3.858	SE A,f	EL/DS CH
W455H	3M14	432660003	3.859	SE C,E	EL/DS C
W455H	3H12	432660004	3.858	SE D,e	EL/DS C

Function options I/O-1 and I/O-2

Function options for Type 1 and Type 2 I/O modules

Function options, I/O module Type 1				
A	B	C	D	E
Waste	Waste	Waste	Waste	Waste
Heating	Heating	Heating	Heating	Heating
3 Hot water	3 Hot water	–	1 Hot water	1 Hot water
3 Cold water	4 Cold water	4 Cold water	5 Cold water	1 Cold water

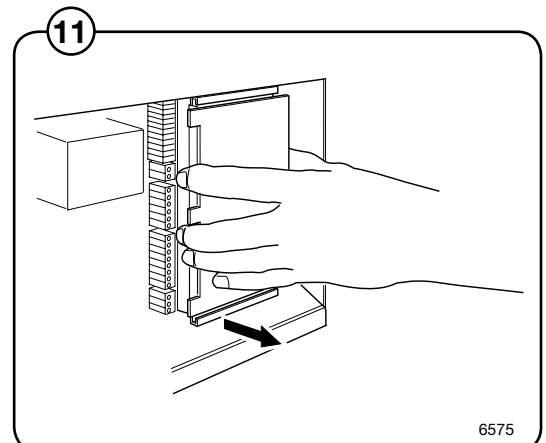
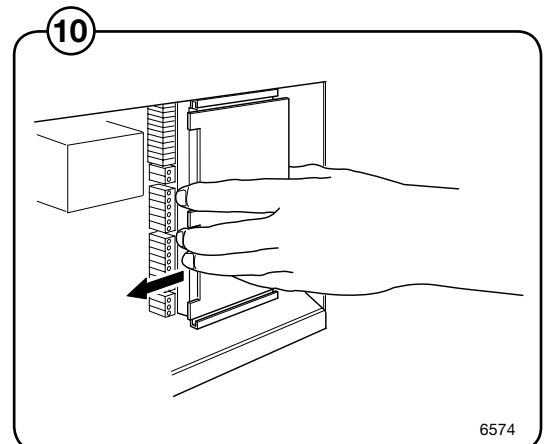
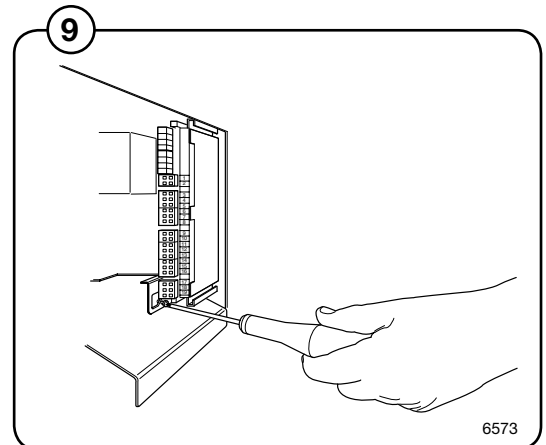
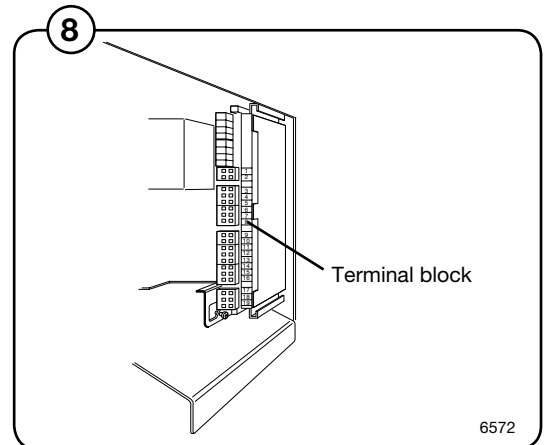
Function options, I/O module Type 2						
A	B	C	D	E	F	G
External slot meter	Start block	Start block	Price reduction	PC 5	Start block	Heat switch
Price programming	Start/Pause	Heating pause	Heating pause	Heating pause	Heating pause	Start/Pause
Detergent tank empty	Detergent tank empty	Detergent tank empty	Detergent tank empty	Detergent tank empty	Detergent tank empty	Detergent tank empty
Temporary pause	Temporary pause	Temporary pause	Temporary pause	Temporary pause	Temporary pause	Temporary pause
5 detergent signals	5 detergent signals	5 detergent signals	5 detergent signals	5 detergent signals	5 detergent signals	5 detergent signals
1 programme signal	1 programme signal	Free machine	1 programme signal	1 programme signal	1 programme signal	Gas heating

Replacement of I/O module

I/O modules 1 and 2 are installed in the same way, but are located in different parts of the machine. The following illustration only shows how to replace I/O module 2, but the same procedure also applies to I/O module 1.

I/O module 2 is located on the rear PCB and accessible once the protective plate is removed.

- 8 • Remove the electrical connections on the module.
- 9 • Using a screwdriver, undo the lock screw holding the module in position.
- 10 • Rotate the module to the left.
- 11 • Lift out the module
- 12 • Fit the new module by reversing the removal procedure.



External connections to I/O module type 2

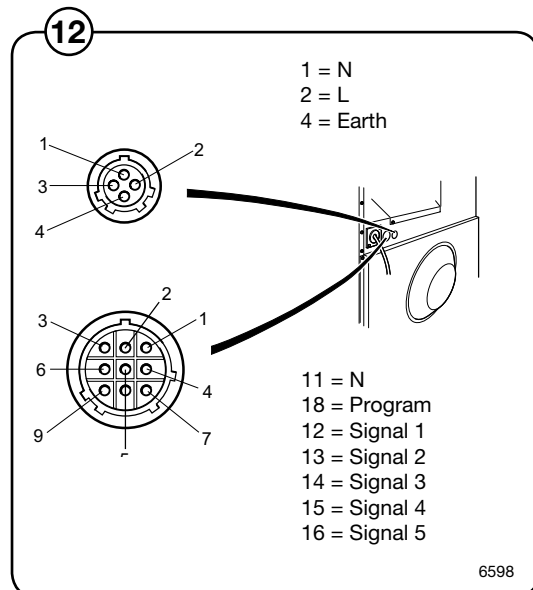
Connection of external dosing equipment



The external dosing equipment power supply must never be connected to the machine's incoming terminal block.

Machines fitted with connectors

- 12
- Connect the pump assembly to connections A and B on the washing machine. Connect the signal cable to B and the power supply to A.

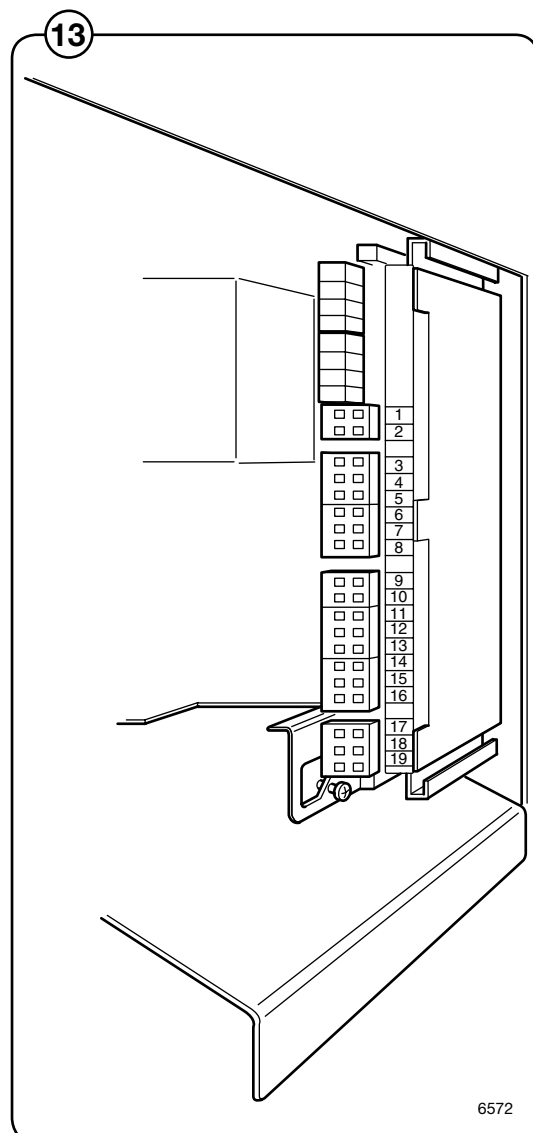


Machines without connectors

- 13
- Connect the external pump assembly for liquid washing detergent to I/O module 2, which is located to the right of the incoming power supply.

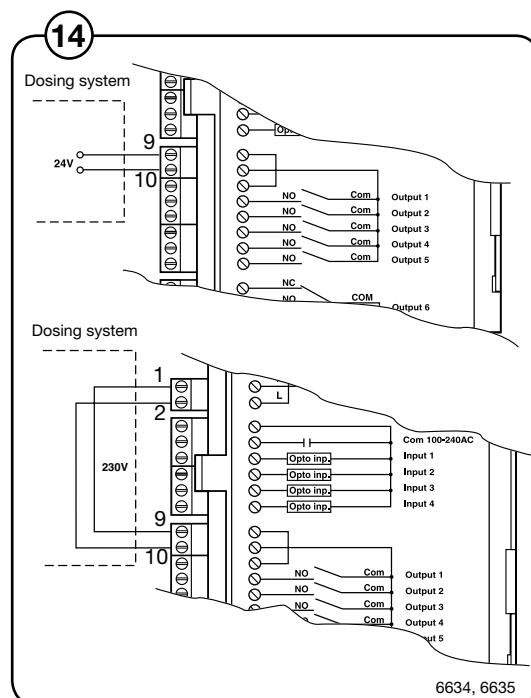
The I/O module has edge connectors for connecting external pumps.

The edge connectors may be removed from the board when connecting the cabling.



Outputs

- 14 • External power supply (e.g. 24V DC) for pumps is to be connected to 9 and 10. If the internal power supply (from the washing machine) is to be used, it may be taken from 1 (N) and connected to 9 and from 2 (L) and connected to 10. The outputs may be loaded with max 0.5 A.
- 15 • Signals for pumps 1 - 5 are to be connected to connections 12 - 16 where:
- 12 = Detergent signal 1
 13 = Detergent signal 2
 14 = Detergent signal 3
 15 = Detergent signal 4
 16 = Detergent signal 5
- The programs held on the machine can be found on the machine's data plate.



	3M14*	3F01*	3R01*	3F02*	Other programs
Signal 1	–	Prewash	Prewash	Prewash	Prewash
Signal 2	Main wash	Main wash	Main wash	Main wash	Main wash
Signal 3	Rinse agent	Rinse agent	Rinse agent	Rinse agent	Rinse agent
Signal 4	Mop last rinse	Disinfection	Last rinse	Main wash	–
Signal 5	Bleaching agent	Bleaching agent	Bleaching agent	Bleaching agent	Bleaching agent

* M = Mop, F = Farm, R = Restaurant

Inputs

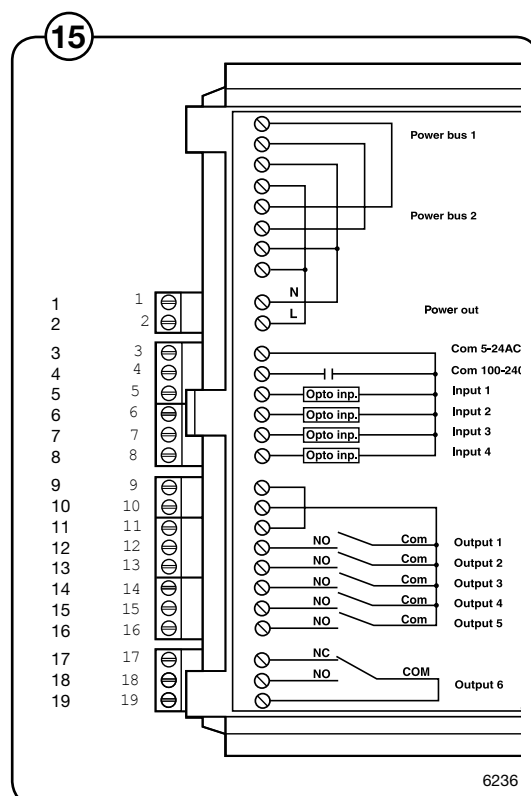
- The signal level may be 5 - 24V DC/AC or 100 - 240V AC. At 5 - 24V, the signal reference must be connected to 3 and at 100 - 240V to 4.

NB

Do not mix potentials on the inputs.

NB

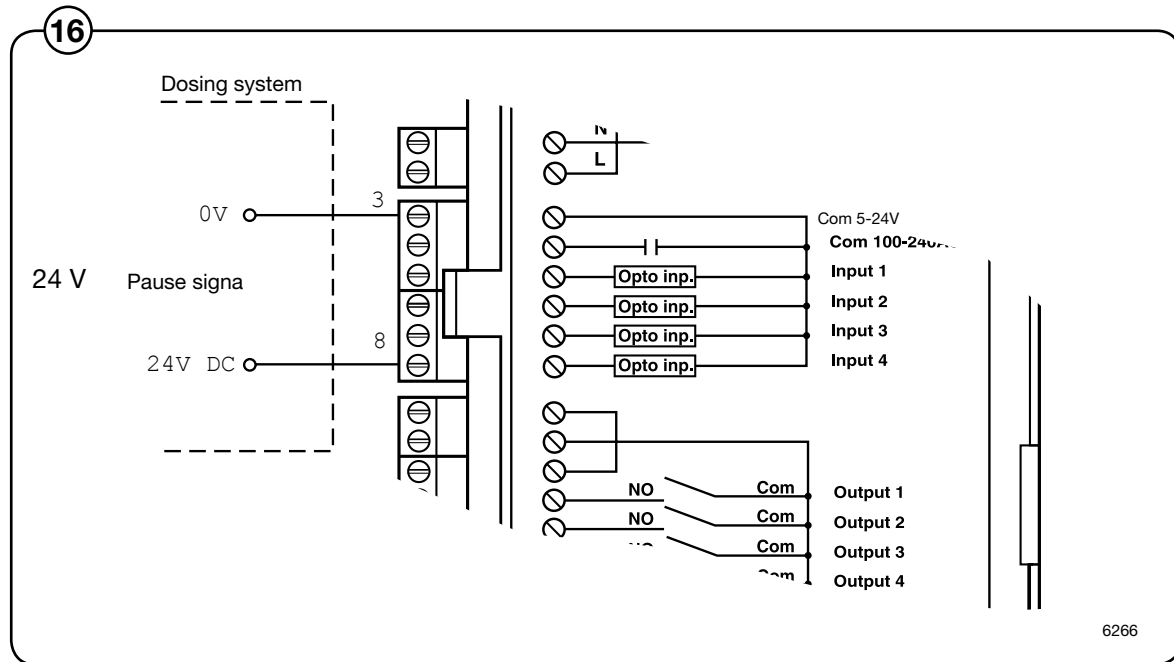
Connecting excessive voltage (> 24V) to connection 3 may damage the I/O module.



16

- Connection 8 may be connected if there is to be a pause in the wash program, e.g. while detergent is being dosed.

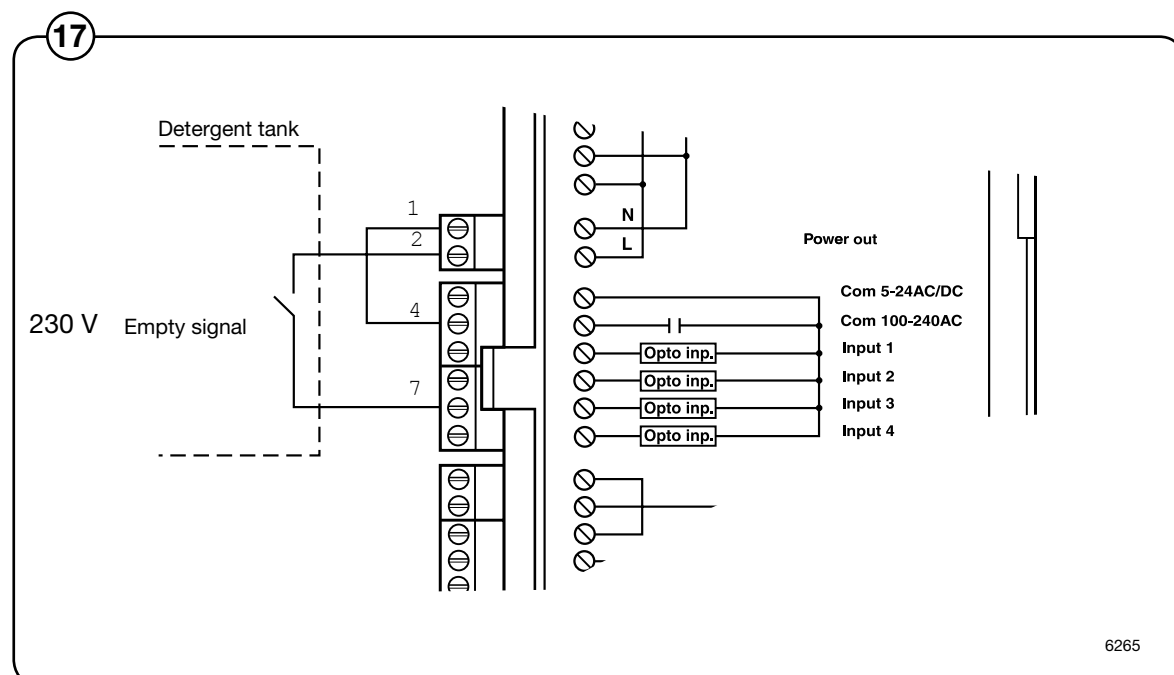
The figure shows an example of engaging a 24V pause signal. The wash program will pause for as long as the pause signal remains active (high).



17

- If connection 7 is connected, an error message will be shown in the display if any of the chemical tanks are empty. However, the wash program will continue.

The figure shows an example of engaging a normal open contact.

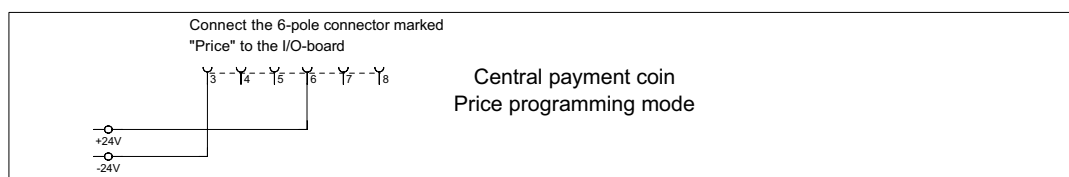
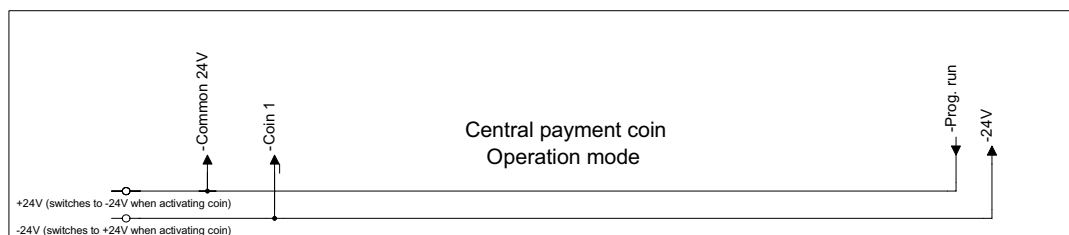
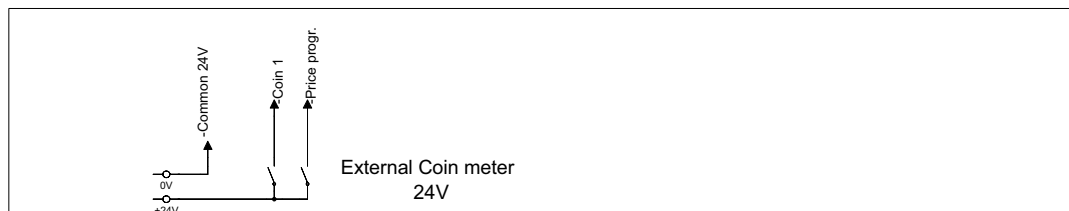
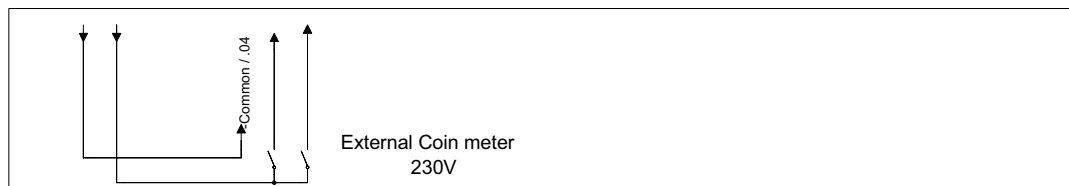
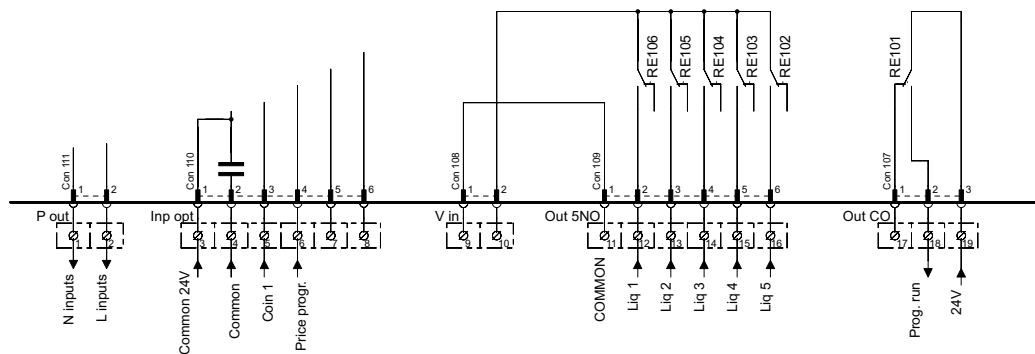


Circuit diagram of function options for I/O module type 2

The wiring diagram for I/O module type 2 may be one of the following variants: 22A, 22B, 22C, 22D, 22E, 22F or 22G.

22A

Type of I/O card	2
Address	2
Function I/O:s	A

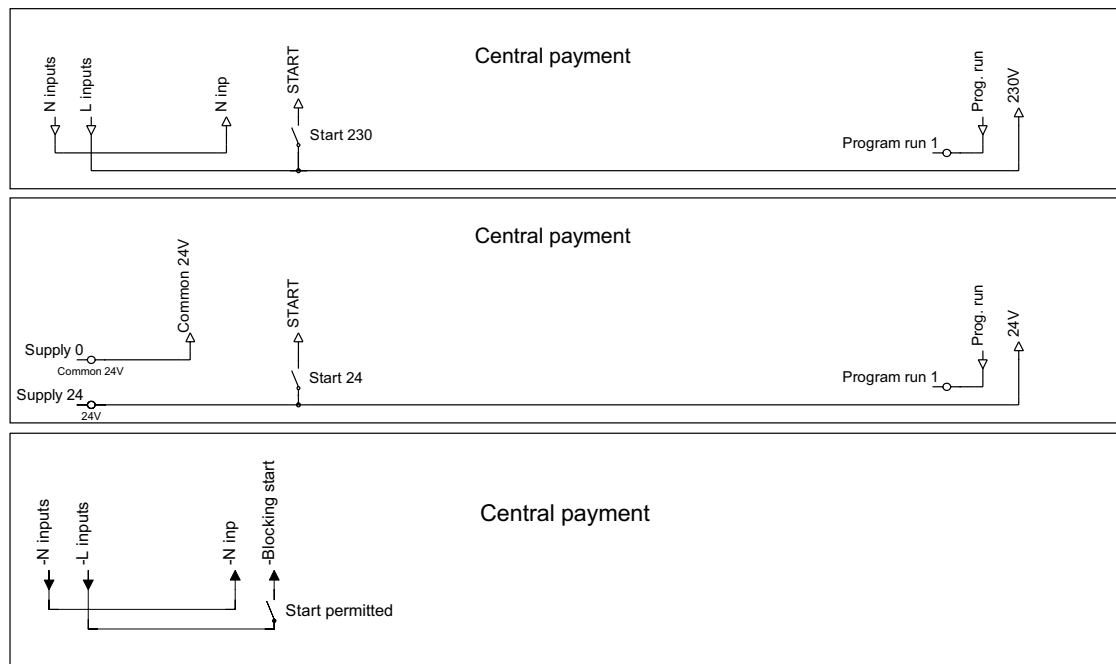
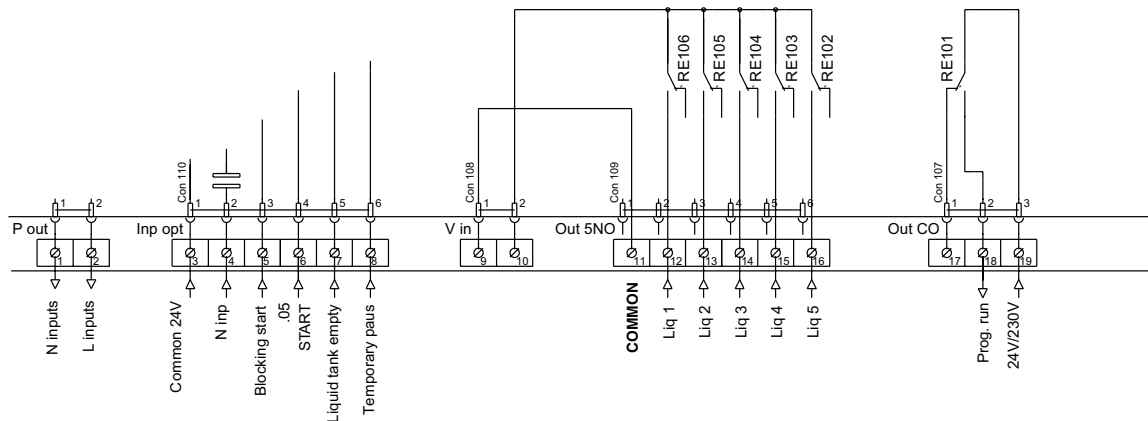


6606

- The signal received from external slot meters must be a pulse. In order to program prices, the signal initiating the programming procedure must be active (high).

22B

Type of I/O card	2
Address	2
Function I/O:s	B

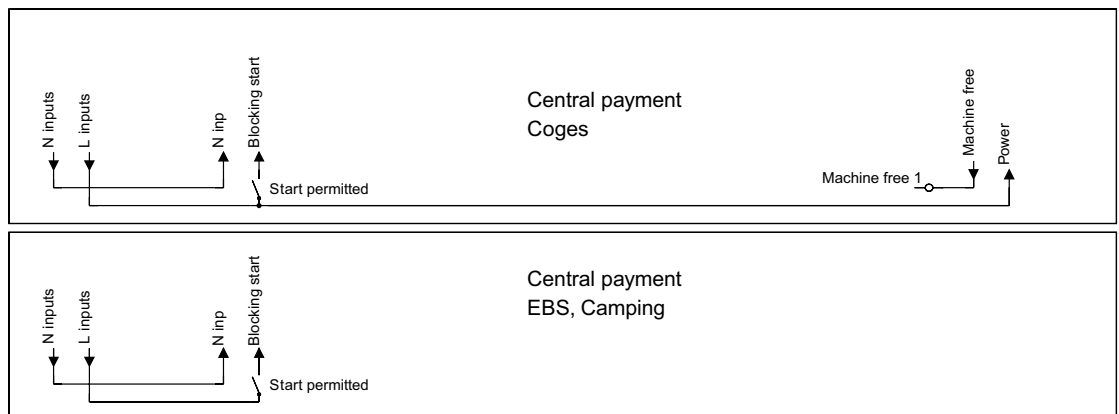
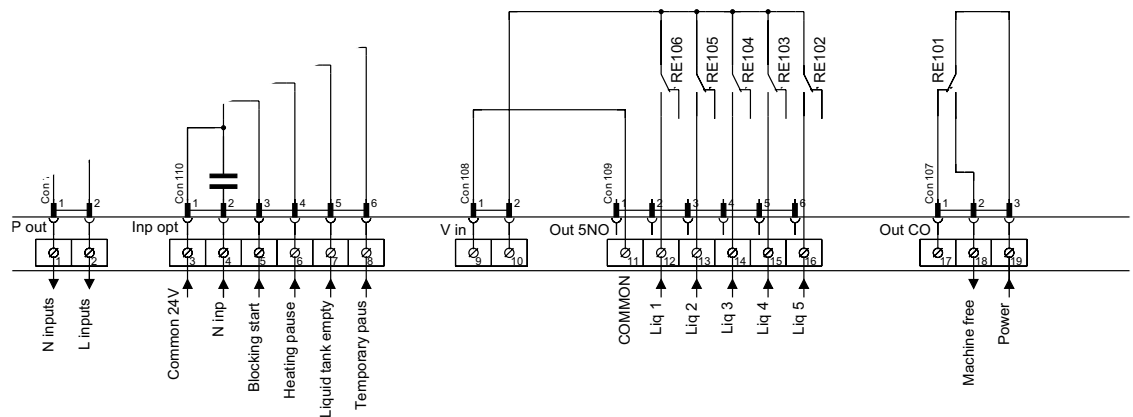


6316

- To start the machine from a central payment system, the payment system must transmit a start pulse to the washing machine. The start pulse can be either 230V or 24V. In order to receive a feedback signal once the machine has started, 230V or 24V must be connected to connection 19. The feedback signal on connection 18 remains active (high) during the entire wash program.

22C

Type of I/O card	2
Address	2
Function I/O:s	C

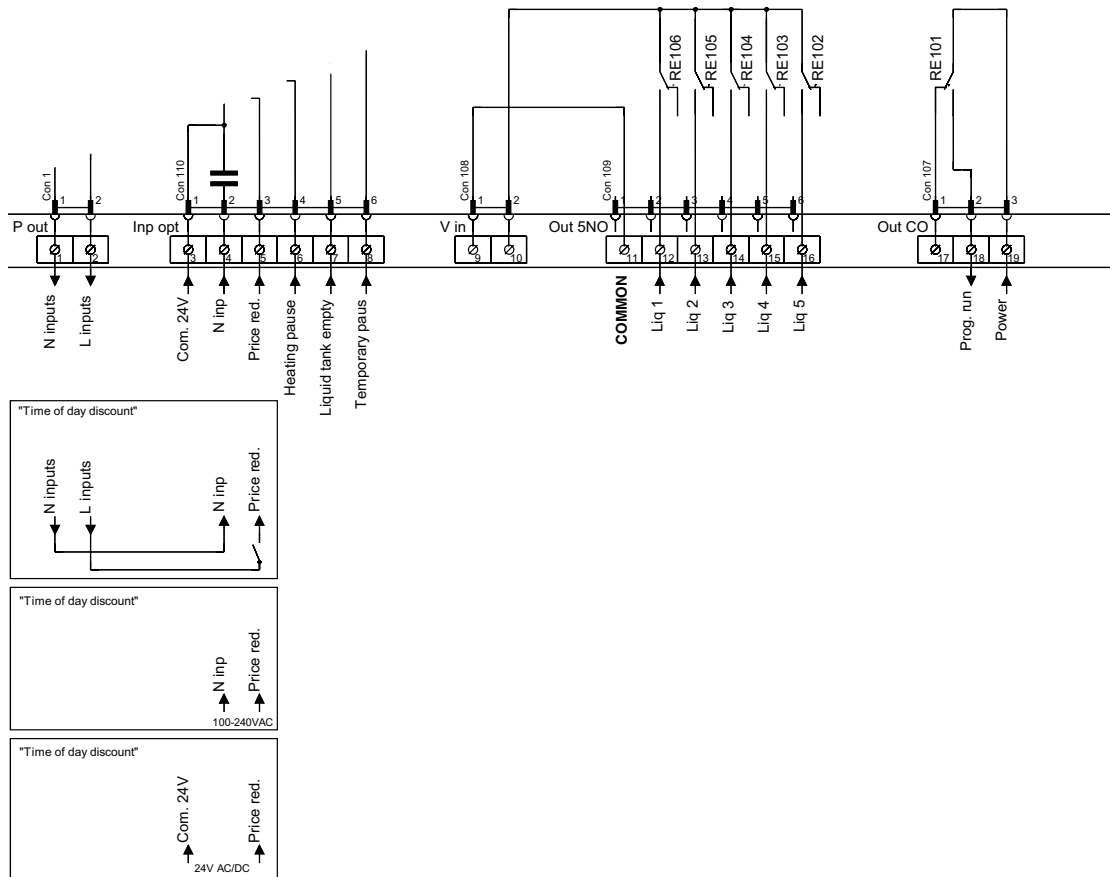


6313

- The central payment or booking system shall transmit an active (high) signal to the washing machine once permission has been granted to start the machine. The signal must remain active (high) until the machine starts. A feedback signal will be present on connection 18 and remain active (high) whilst the machine door is closed but the wash program has not started. The feedback signal is powered by 230V or 24V from connection 19.

22D

Type of I/O card	2
Address	2
Function I/O:s	D

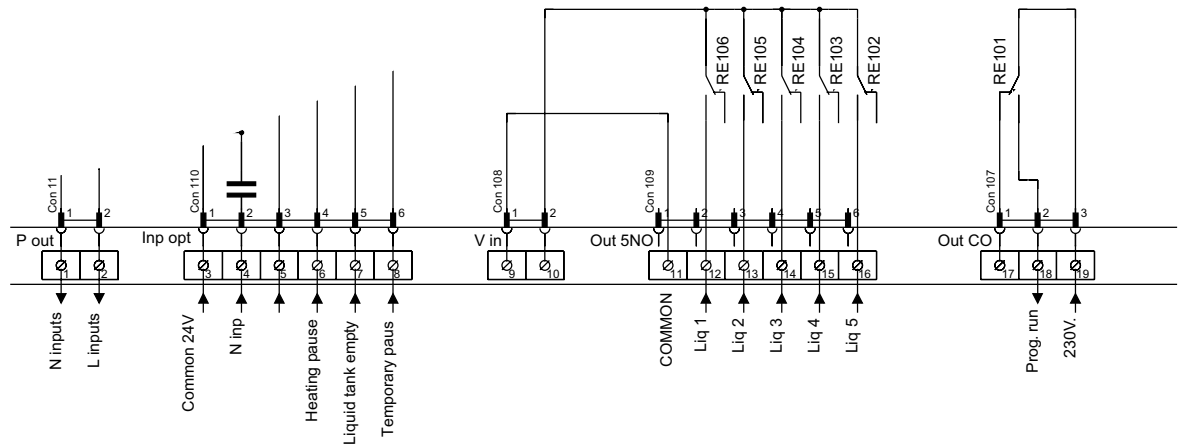


6314

- The figure shows standard function addressing for machines with the 3L41 program package.
- By maintaining an activated (high) signal on connection 5 ("Price red"), the price of the wash program can be reduced. This function has a number of uses, including providing reductions during a specific period of the day. Whilst the signal remains active (high), the price of the wash program is reduced by the percentage entered in the price programming menu.

22E

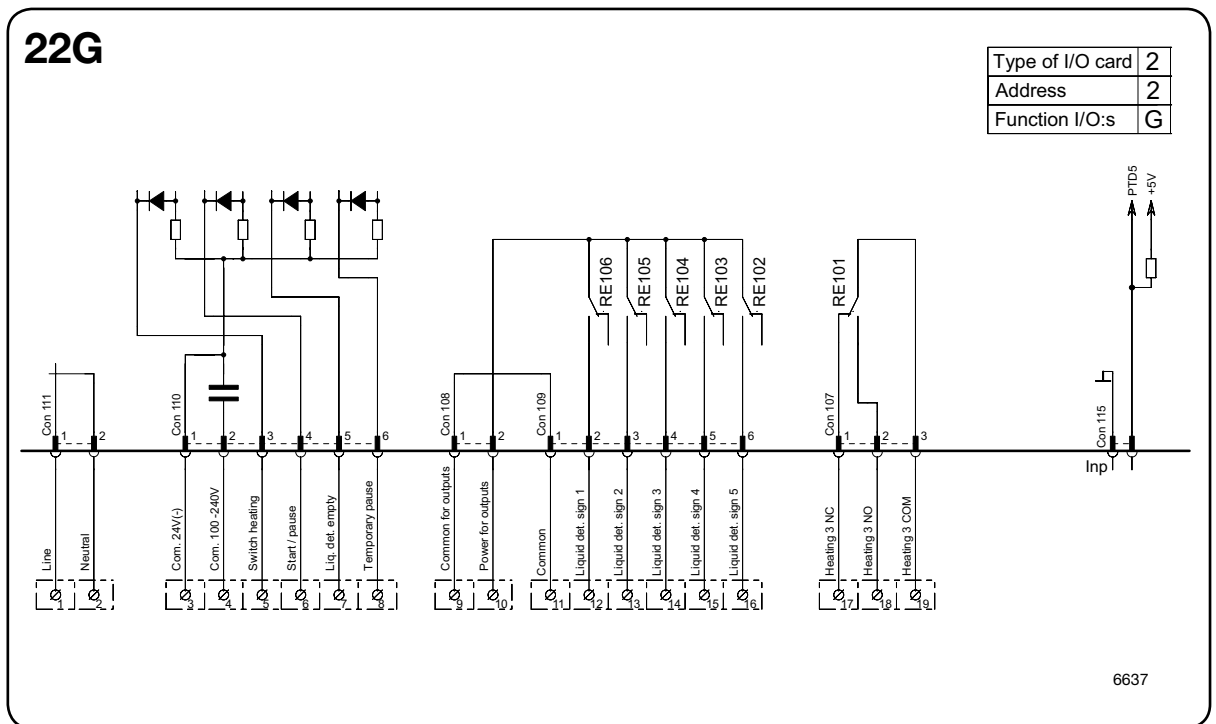
Type of I/O card	2
Address	2
Function I/O:s	E



6315

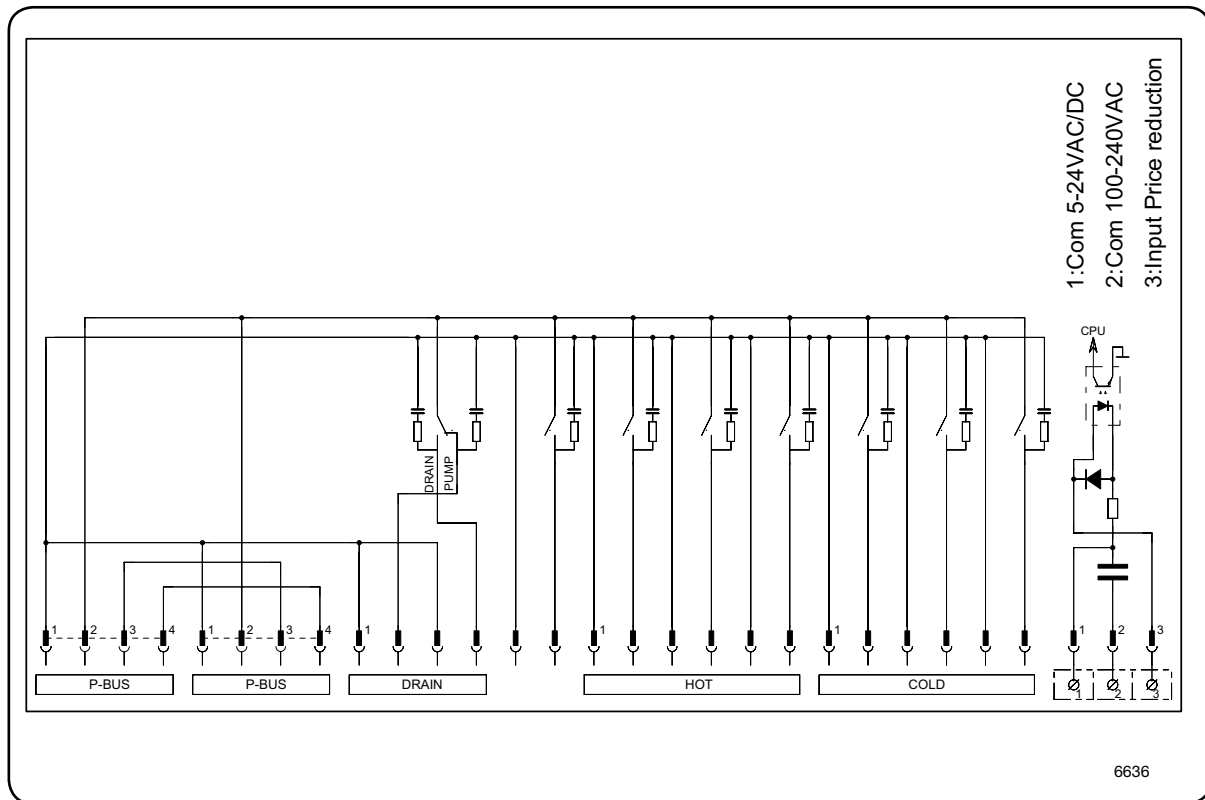
- **Heating pause:** By connecting a signal to connection 6, you can pause operation of the machine whilst it heats up. The machine will pause for as long as the pause signal remains active (high).

22F



- The gas heating unit must be connected to connections 17, 18 and 19.

Machines with I/O module type 3



- By maintaining an active (high) signal on connection 3 "Price reduction", the price of the wash program can be reduced. This function has a number of uses, including providing reductions during a specific period of the day. Whilst the signal remains active (high), the price of the wash program is reduced by the percentage entered in the price programming menu.

Addressing I/O modules

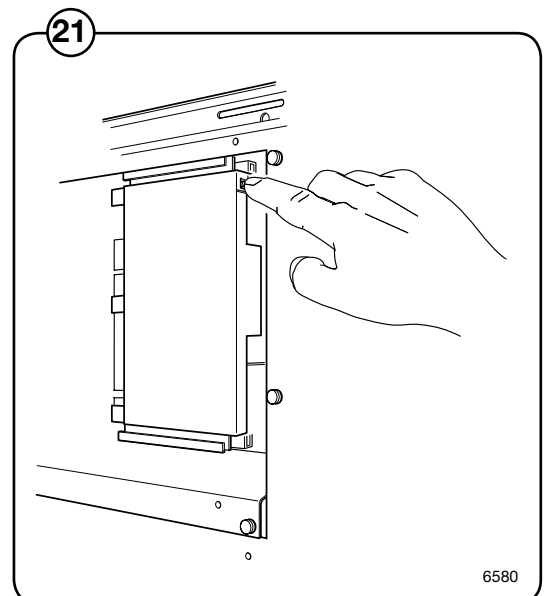
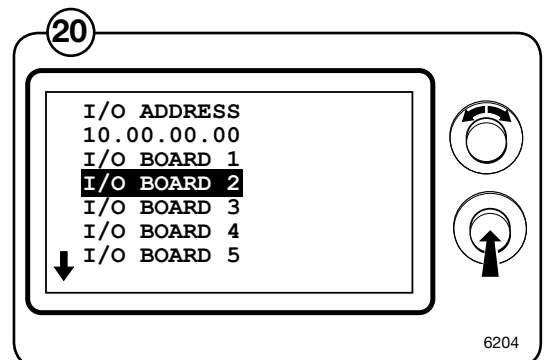
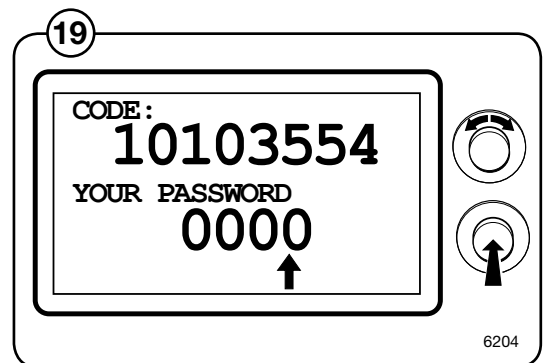
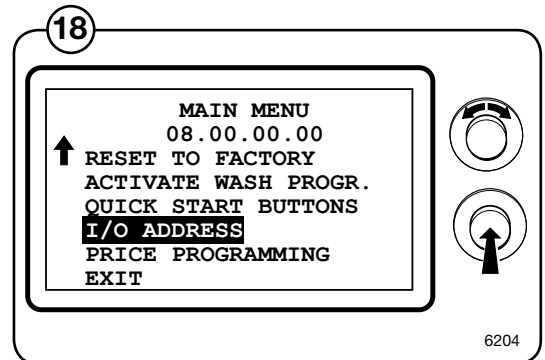
After replacing an I/O module or in instances where a second module has been added to a washing machine, the new I/O module must be addressed in order to activate its function options. The function options of the module are controlled by the parameter software loaded on the relevant program device.

- Engage the machine's service mode.
- 18 • Highlight the I/O ADDRESS line in the main menu and press the knob.
- 19 The display will now show an 8-digit code.
 - Call authorised service and quote the code.

Authorised service will then assign a pass code.

 - Enter the code you have been given and press the knob.

The I/O ADDRESS menu will appear in the display.
- 20 • Highlight the I/O module to be addressed and press the knob.
- 21 • Press the service switch on the I/O module indicated in the display.
 - Where multiple I/O modules are to be addressed, repeat the procedure for the relevant modules.
 - Exit the service program.

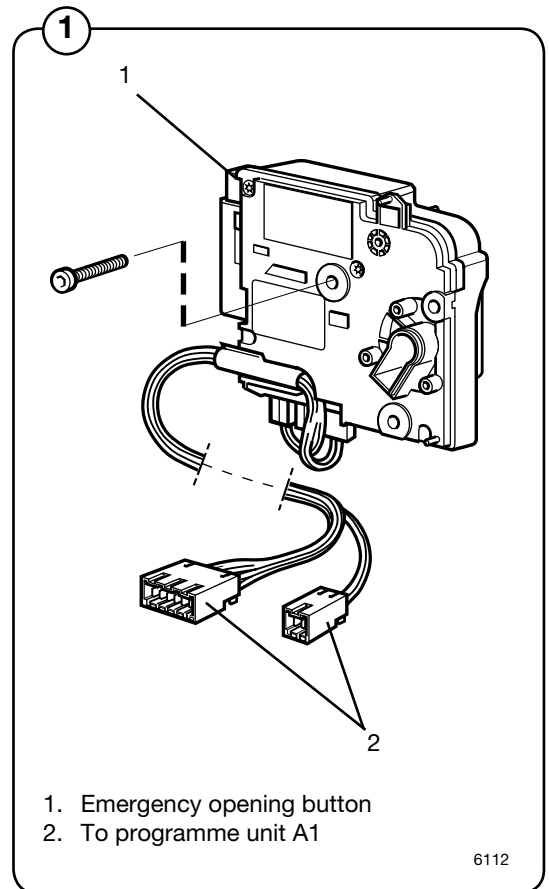


Door and door lock

Description

General

- ① The door locks consists of the following:
 - **Door lock**, which contains
 - An **actuator** that locks the door lock and also has two built-in micro switches, S4a and S4b. The actuator is bi-stable, i.e., it has two stable positions: locked door and unlocked door. The actuator must receive a pulse to lock and unlock the door lock. S4a and S4b are both closed when the door is locked.
 - A **micro switch S3** that is closed when the door is closed.
 - An **emergency opening button** that can be used to open the door lock in an emergency.



Function

The door lock locks the door

- ② When the door is closed (closed door lock switch S3), the programme unit may request door locking by applying a voltage of 200-240 V on the door lock controller A31 input X92.

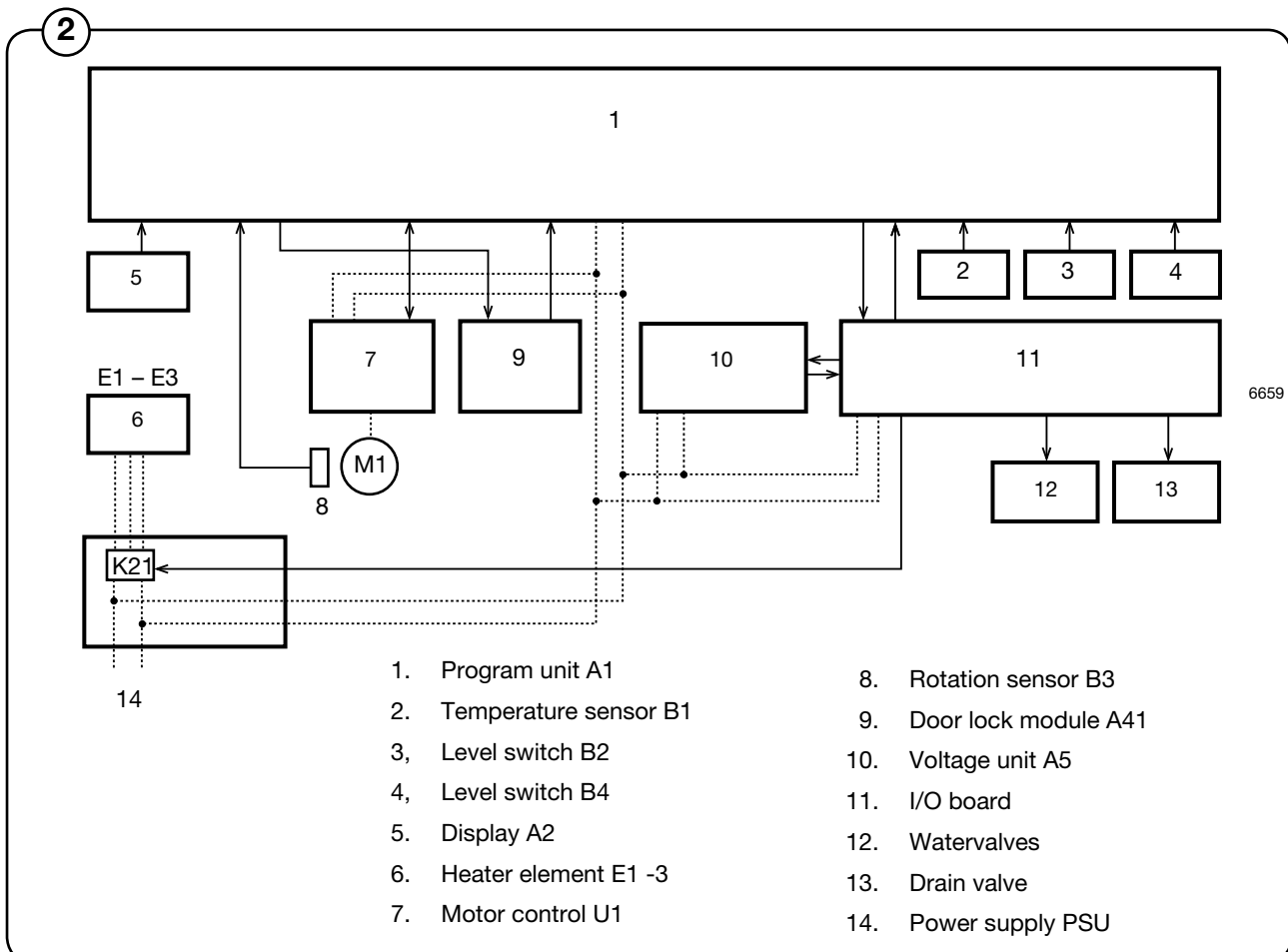
The following check is made by the A31 card prior to locking of the door:

- **No water in drum** - input "level" from level guard B2 is closed = 0 V
- **Drum not turning** - pulse frequency on input "Tacho" from rotation sensor B3 less than 0.4 Hz.

When the above conditions are met, the card A1 outputs a closing pulse on output D0 to the door lock actuator/coil, which then locks the door. The micro switches S4a and S4b in the actuator/door lock are closed when the door is locked. These micro switches feed voltage to:

- **The output relays** on the programme unit card. The relays control the machine's drain and water valves as well as heater switch-on.
- **Interlock signal** for motor control (input X302) that releases the motor start prevention state.

Programme operation is now possible.



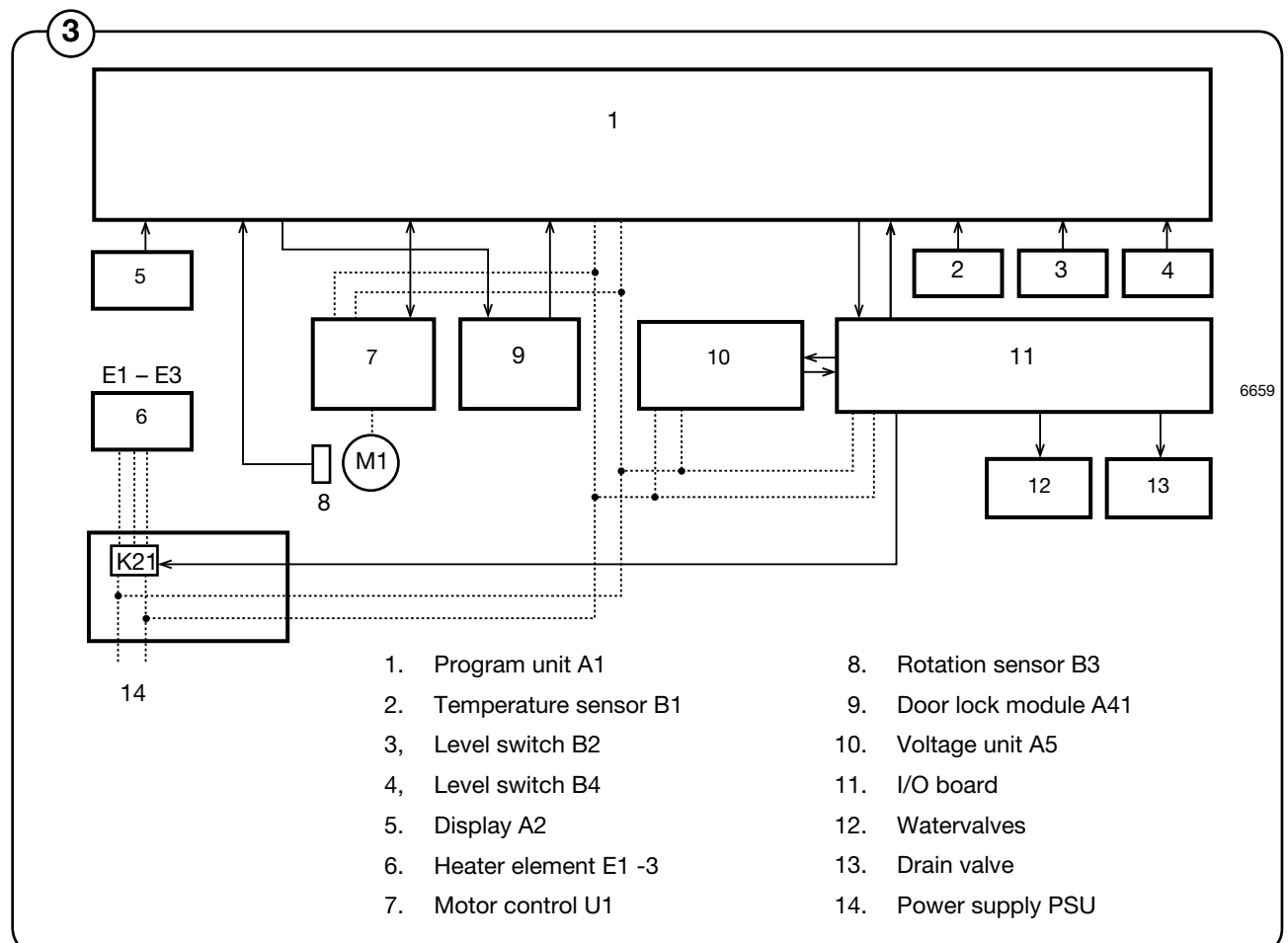
The door lock unlocks the door

- ③ The programme unit requests door unlocking by applying 0 V on input X92 of the door lock controller.

The following check is made prior to unlocking of the door:

- **No water in drum** - input "Level" from level guard B2 is closed = 0 V
- **Drum not turning** - pulse frequency on input "Tacho" from rotation sensor B3 is less than 0.4 Hz.

When the above conditions are met, the door lock controller outputs an opening pulse on output D0 to the door lock actuator/coil, which then unlocks the door. Micro switches S4a and S4b now interrupt the actuator/door lock and the I/O card 1 relays lose all voltage to prevent the motor from starting (interlock signal on motor controller input X302). The drain and water valves of the machine are now disabled and the heater and motor cannot be switched on.

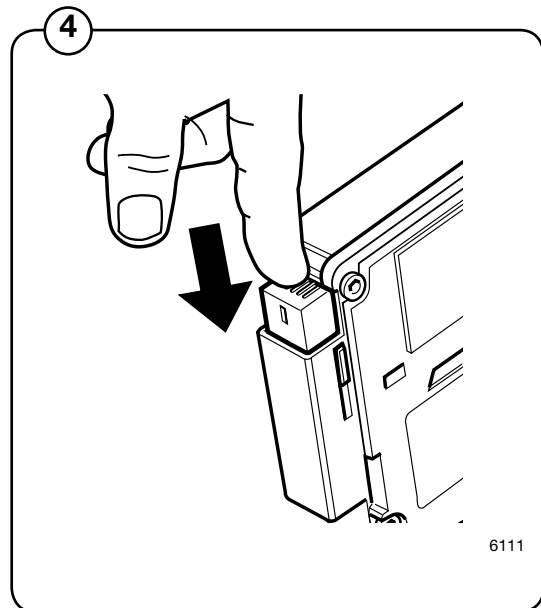


Repairs

Repair work on the machine should only be done by specially trained personnel.

Emergency opening of door lock

- ④ 1. Take down power from the machine by turning the main power switch to the 0 position.
2. Remove the front cover or top cover. When replacing the door lock, it is recommended to remove the front cover.
3. Press down the emergency opening button.



Replacing the door lock

1. Take down power from the machine by turning the main power switch to the 0 position.
2. Remove the front cover alt. side pole.
3. Remove the door (two screws in each hinge).
4. Remove the front panel.
5. Remove the door lock (three holding screws).
6. Verify the strap positions on the cable for the lock. Cut the necessary straps to undo the cables leading to the lock.
7. Undo the connectors.
8. Replace the door lock.
9. Reconnect the new (door) lock.
10. Assemble in reverse order.
11. Strap the cables for the lock according to the notes made in step 6.

Motor and motor control

Warnings



DANGER



Be careful when measuring the electric components in the motor control. All components have a potential difference of approx. 300 V in relation to protective earth and neutral.

When the green LED on the motor control card is lit, the components carry dangerous voltages.

The motor control lose all voltage about 10-30 seconds after the voltage has been disconnected and the motor has stopped.

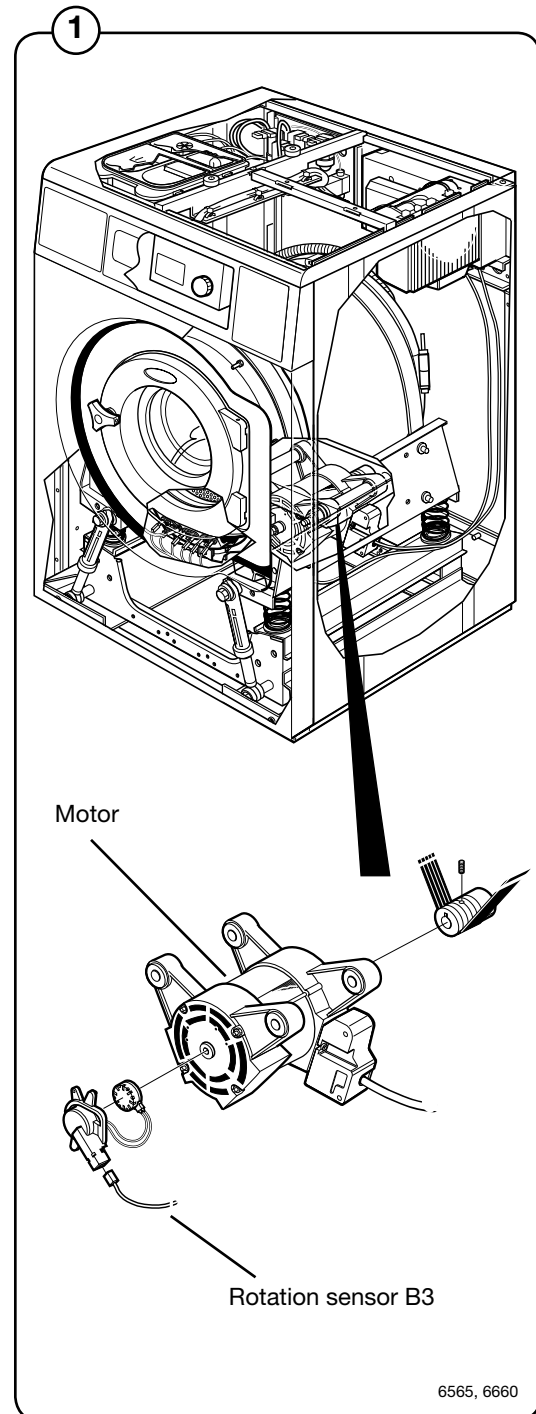
Description**Motor**

- ① The motor is fitted in a bridge carrier under the outer drum. It drives the washing drum using a drive belt.

The motor is frequency-regulated and is controlled by a microcomputer control. The various speeds for normal operation, distribution speeds and extraction as well as acceleration/retardation can be controlled with a high degree of precision.

The motor winding is protected against overload due to the fact that the motor control unit monitors the winding resistance of the motor.

The motor is connected directly to the motor controller via a cable with quick connectors.



Motor control

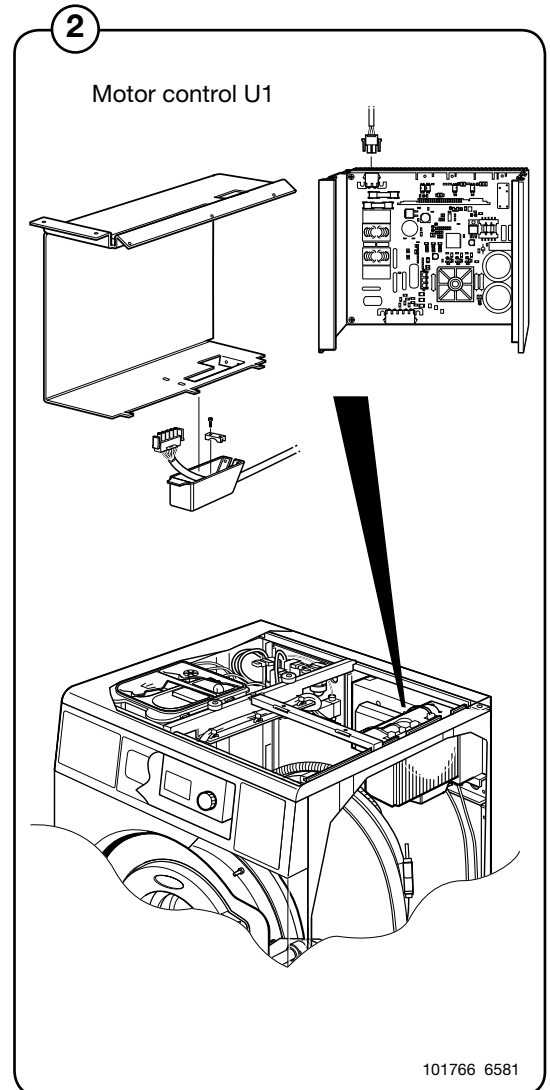
- ② The motor control unit is microcomputer controlled and is situated under the top cover of the machine, right above the outer drum.

The unit consists of a PCB (mother board) fitted on a heat sink that does double-duty as part of the housing.

The cable harness is directly connected to the PCB, voltage supply input and the voltage supply to the motor using connectors; the other cables are connected with flat connectors to the PCB.

A detailed description of input and output cables is presented in the section “Function”.

Depending on the machine size, this unit comes in four different versions. The units have different sizes in order to be able to control motors of different sizes. Larger machines also have ventilation fans, however the function and connections are identical.



Function



DANGER

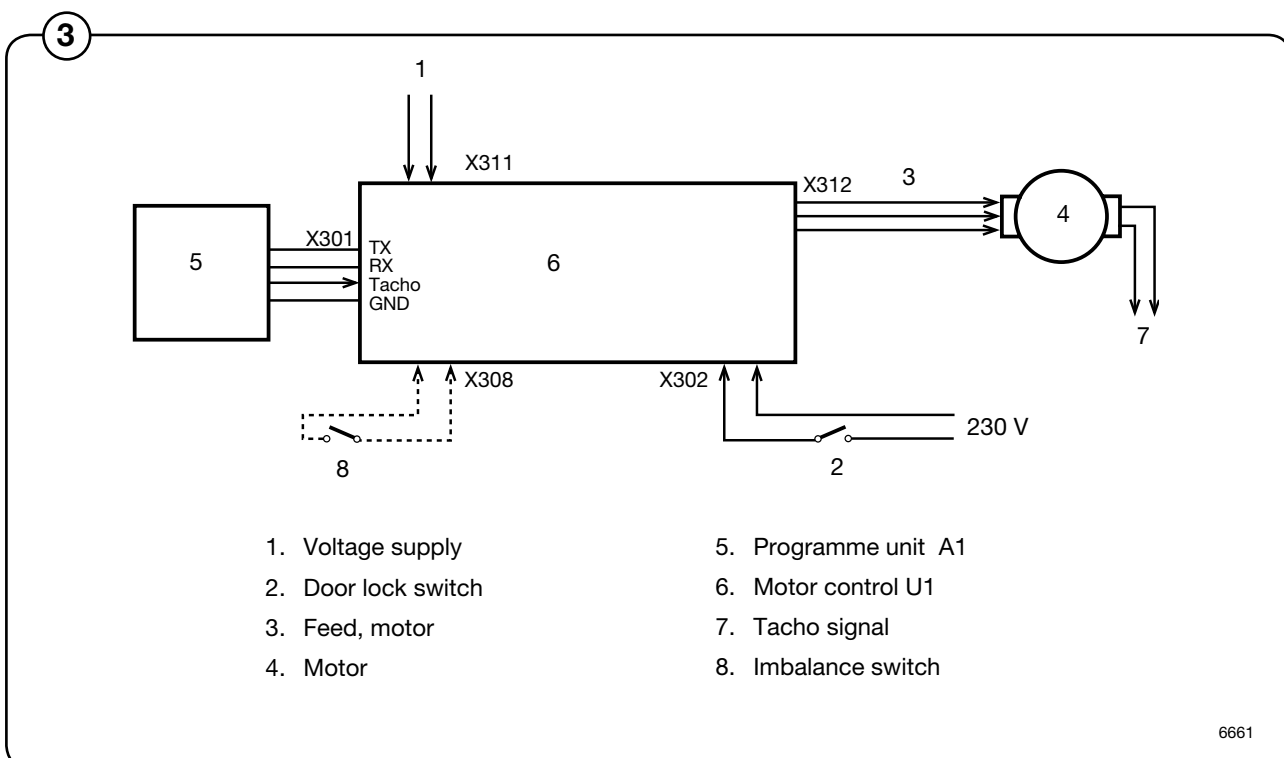


Be careful when measuring the electric components in the motor control. All components have a potential difference of approx. 300 V in relation to protective earth and neutral.

When the green LED on the motor control card is lit, the components carry dangerous voltages.

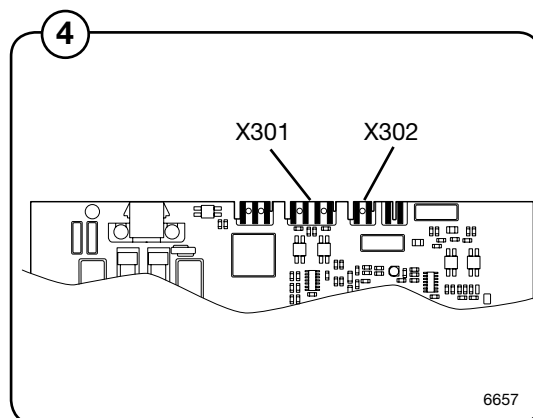
The motor control lose all voltage about 10-30 seconds after the voltage has been disconnected and the motor has stopped.

- ③ The motor control communicates with the programme unit via a serial two-way interface. With the help of the motor control, the programme unit can control not only the instantaneous motor rpm, but also with high precision the acceleration and retardation of the motor in order to reach the target rpm. The motor control continuously replies with information to the programme unit PCB regarding the current operating state and sends reports if an error occurs.



The motor control is also able to deliver the various instantaneous and output values during constant speed, acceleration and retardation. These values are used to calculate the weight of the loaded laundry and to detect any load imbalances. A separate imbalance switch can also be connected to the motor control.

The safety system of the machine includes double detection of the door lock. Both the programme unit and motor control use different switches to detect proper door locking. The motor cannot start unless both switches verify the door is locked.



Inputs and outputs

4 X301: Serial communication

Handles communication between the motor control and the programme unit. Using a special interface, it is possible to connect a PC for testing the motor control.

Card No.	Function
X 301:1	Tacho signal
X 301:2	Gnd
X 301:3	Txd
X 301:4	Rxd

X302: Lock sequence input

Detects when the door is locked or unlocked. The motor cannot start until the door has been locked. If the indication disappears when the motor is operating, the motor stops and an error message is shown on the programme unit display.

Input voltage			
min:	120 V-20 %	50/60 Hz	
max:	240 V+15 %	50/60 Hz	
Current:	max:	0,01 A	

X308: Imbalance switch

Input from the imbalance switch (only fitted on some machines). The imbalance switch is normal open.

Input voltage			
min:	120 V-20 %	50/60 Hz	
max:	240 V+15 %	50/60 Hz	
Current:	max:	0,01 A	

X311: Voltage supply

Input voltage, single phase or rectified three-phase

min: 200V-15%
max: 240V+10%

6

X312: AC supply to motor and input from the motor thermal protector

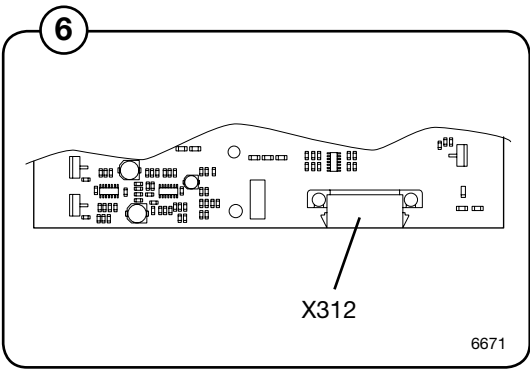
The motor is fed with alternating current with varying frequency that is proportional to the motor speed.

EX618-EX630

Card No.	Function
X 312:1	AC supply to motor, phase 1
X 312:2	AC supply to motor, phase 2
X 312:3	AC supply to motor, phase 3

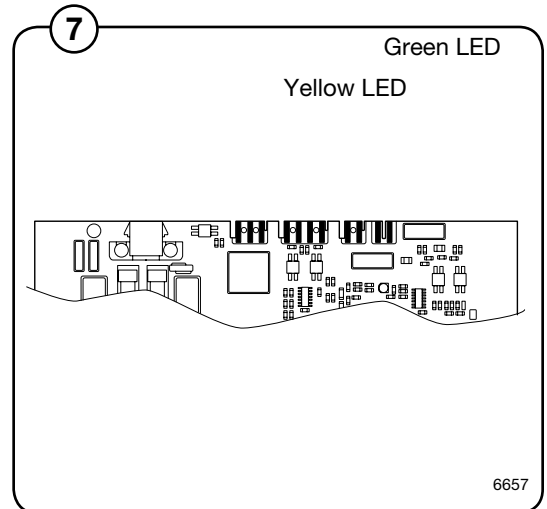
EX640-EX670

Card No.	Function
X 312:1,2	AC supply to motor, phase 1
X 312:3,4	AC supply to motor, phase 2
X 312:5,6	AC supply to motor, phase 3



LED indications

- 7 Two LEDs, one yellow and one green, indicate any errors on the motor controller and motor.
- 8 The table below shows the blinking patterns of the various error codes.



8

Green LED

LED blinking pattern	Cause
	OK blink (brief pause every 5 seconds)
	Microcomputer in motor control unit not working, voltage is on.
	Current limiter of motor control has switched on.

Yellow LED

LED blinking pattern	Error code on display	Cause
	31E	HEATSINK TOO HOT
	32E	MOTOR TOO HOT
	33E	NO INTERLOCK
	13E	NO MOTOR COMM.
	-	-
	35E	MOTOR SHORTCIRCUIT
	36E	INTERLOCK HARDWARE
	37E	LOW DC VOLTAGE
	38E	HIGH DC VOLTAGE
	45E	MOTOR NOT FOLLOW

approx. 5 seconds

Repairs



Repair work on the machine should only be done by specially trained personnel.



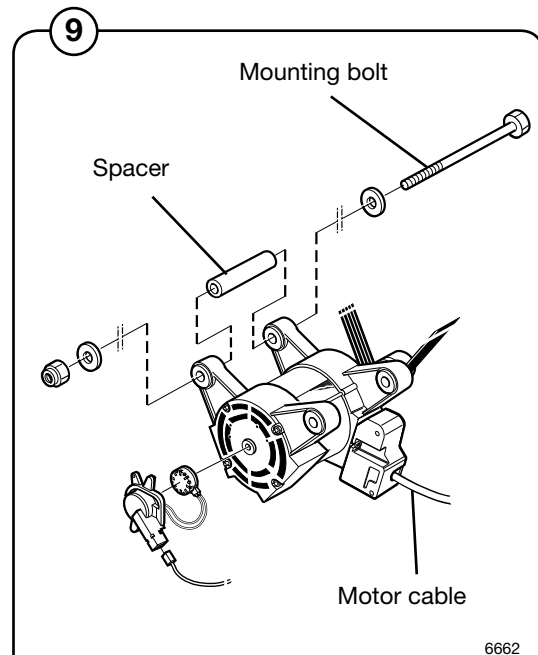
Motor replacement

Disassembly

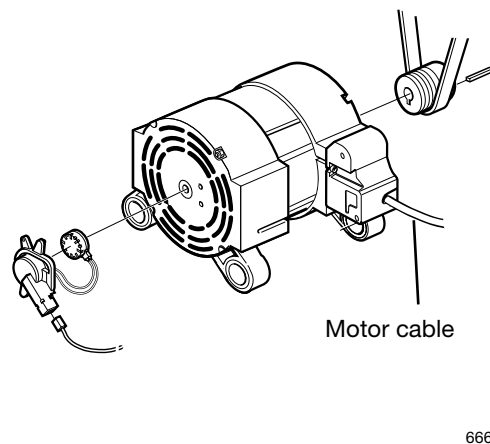
1. Take down power from the machine.
2. Remove the rear cover.
3. Undo the bracket for the drain hose connector from the lower rear piece, then remove the rear cover.
4. Undo the ground connection from the motor.
- 9 5. Remove the drive belt by pulling the belt towards you while rotating the drum by hand.
6. Undo the motor cable from motor.
7. Lock the motor in place to avoid it from falling when lifting it out.
8. Undo and remove the two motor mounting bolts.
9. Lift out the motor.
10. Replace the sensor and magnet from the old motor into the new one.

Assembly

1. Fit the new motor **without** locking the mounting bolts.
2. Fit the drive belt and adjust the belt tension with the tensioner on one side of the motor. See section Adjustments - Drive belt tension for details.



EX – model



SU and W – model

3. Connect the new motor to the cable and use straps to secure the cable.
4. Connect the motor cable to the motor.
5. Fit the lower rear piece and secure the drain hose connection with screws.
6. Fit the upper rear piece.
7. Connect the voltage supply and verify that the motor operates normally.

Adjustments

Drive belt tension

The drive belt is pre-tensioned upon delivery from the factory.

The drive belt tension should be as follows:

10	Model	Force A (N)	Post tensioning B (mm)	New belt C (mm)
	EX618*	30	9	8
	EX618**	30	8	7
	EX625	40	9	8
	EX630	53	10	8
	EX640	68	10	8
	EX655	75	10	8
	EX670	78	10	8

* up to machine No.

** from machine No.

Model	Force A (N)	Post tensioning B (mm)	New belt C (mm)
W/SU620	35	9	8
W/SU625	40	8	7
W/SU630	40	8	7
W/SU640	60	9	7
W/SU655	68	8	7
W/SU675	45	8	6

Up to machine No.

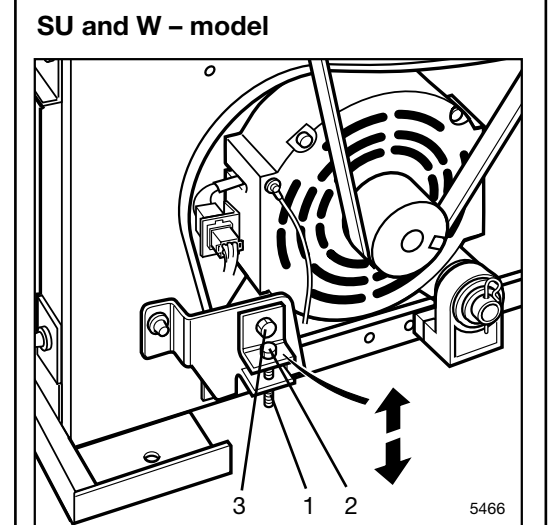
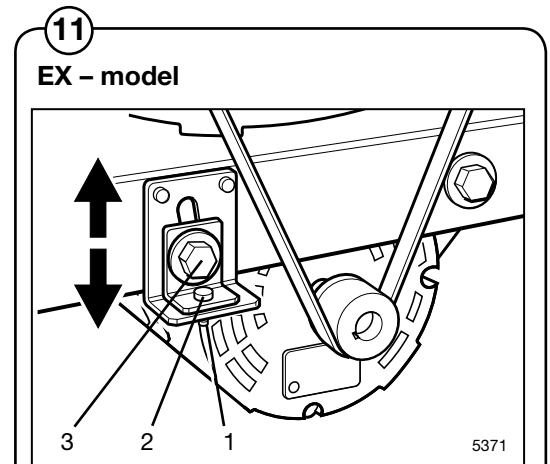
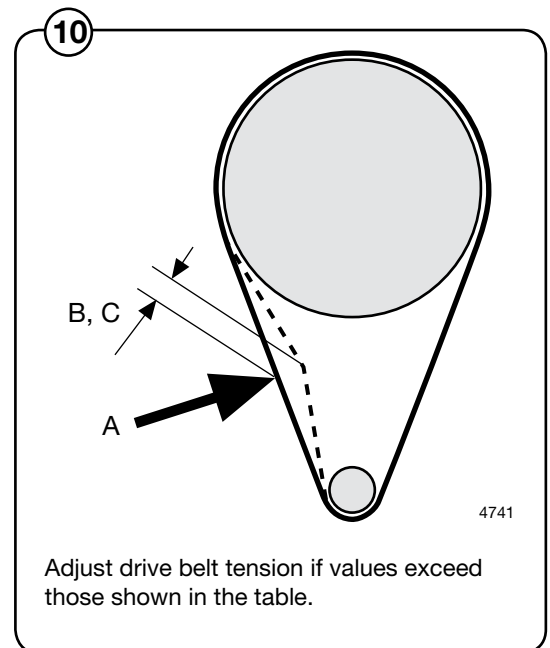
-520/111627

520/111641-115133

520/115144-120398

520/120409-121020

- 11 To adjust drive belt tension, first undo the motor retaining screw a couple of turns, then press down on the motor to achieve proper tensioning. Lock the locking nut when the tension is correct. Then lock the retaining screw.



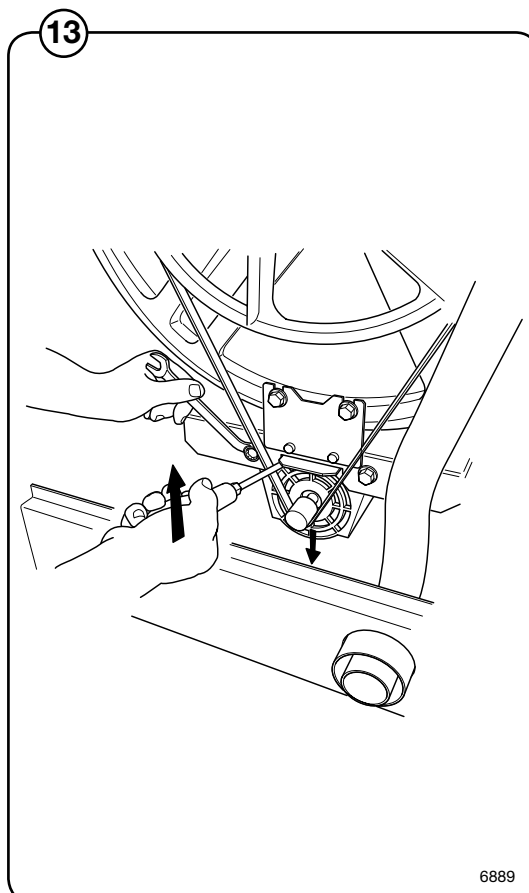
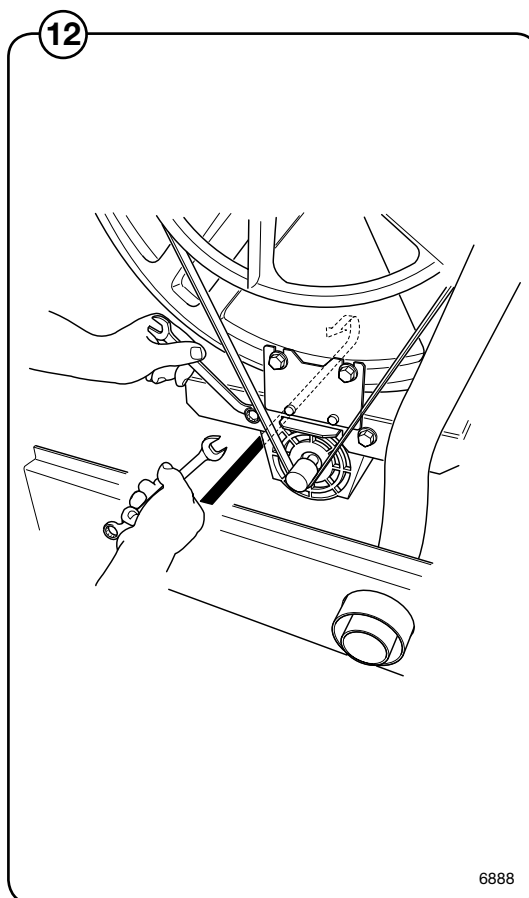
1. Locking nut
2. Adjusting screw
3. Retaining screw for drive belt tension

From machine No.
520/111628-111640
520/115134-115143
520/120399-120408
520/121021-

- ⑫ To adjust drive belt tension: first undo the motor retaining screw (A) by using two cap keys. When undoing screw (A) use one cap key as holder-on on the screw's nut. Press down the motor by using a screw driver in order to tension the belt. Tighten the retaining screw and check the tension according to table.
- ⑬



Inspection of the drive belt tension is an important part of general maintenance.



Drain valve

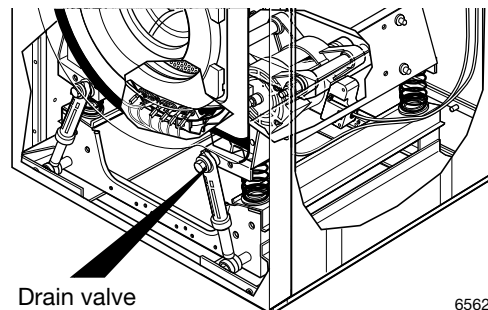
Description

- 1 The drain valve is situated on a flange at the bottom of the outer drum and can be accessed from the front after removing the front cover. The drain valve consists of the following principal parts:

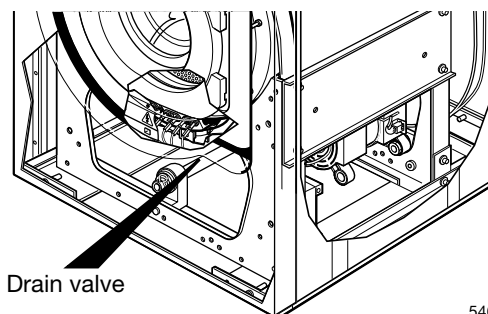
- Lower part with rubber diaphragm.
- Piston and cylinder.
- Pressure plate and recoil springs.
- Rubber diaphragm with drain connection.
- Upper part with connection for outer drum.

1

EX – model



SU and W – model

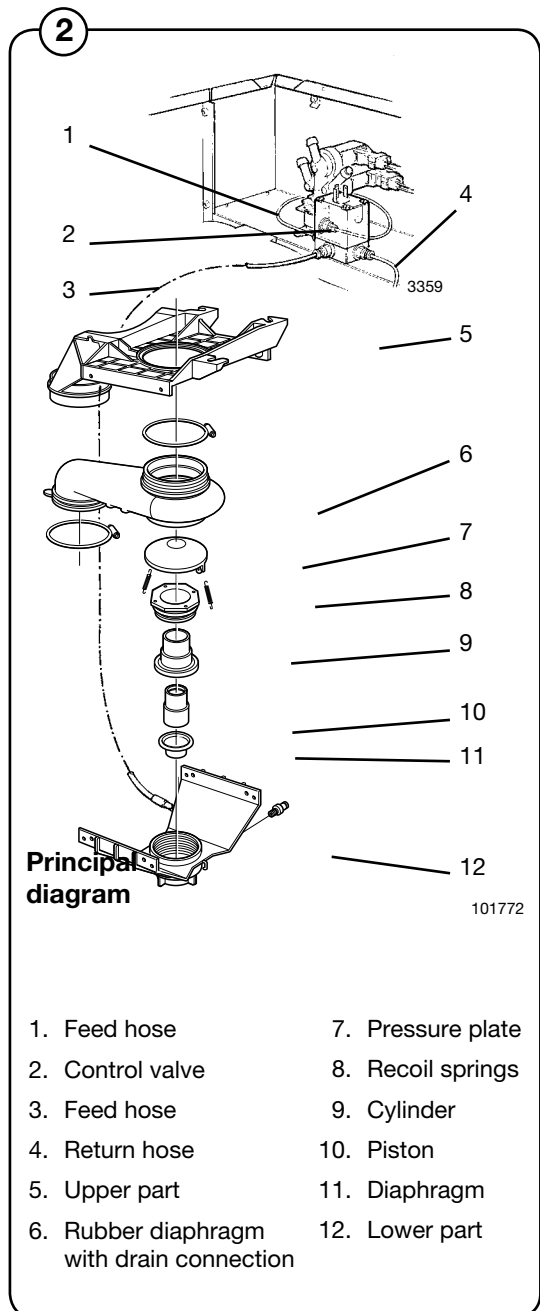


Function

- ② The drain valve uses the water pressure in the cold-water inlet to close the valve. A feed hose is connected between the water inlet and the control valve.

When the control valve operates (drain valve should be closed), the control valve opens the water pressure onto the feed hose, which is connected to the lower part of the drain valve. When the lower part is filled with water, the lower part diaphragm pushes up the piston. The piston lifts the pressure plate against the drain valve rubber diaphragm, which in turn forms a seal against the outer drum, effectively closing the valve.

When the drain valve should be opened, the control valve changes position to allow the water pressure to the lower part of the drain valve to close, instead opening the return hose to the drain. The pressure plate recoil springs pull the pressure plate back, upon which the piston is pressed back into the cylinder. The water from the lower part is fed through the feed hose and the control valve to the drain.



Repairs



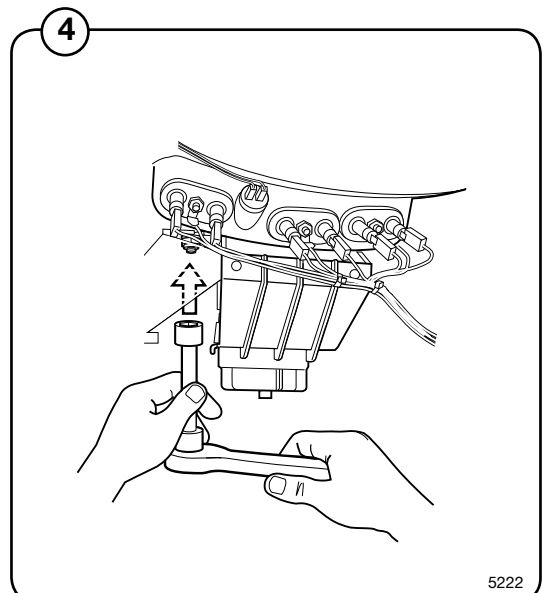
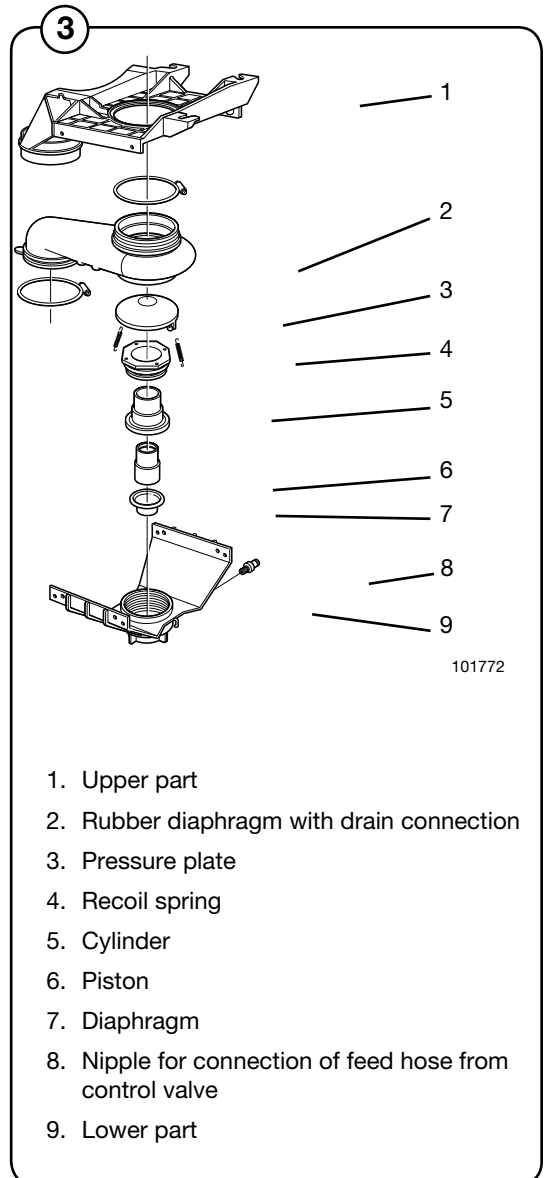
Repair work on the machine should only be done by specially trained personnel.

Disassembly



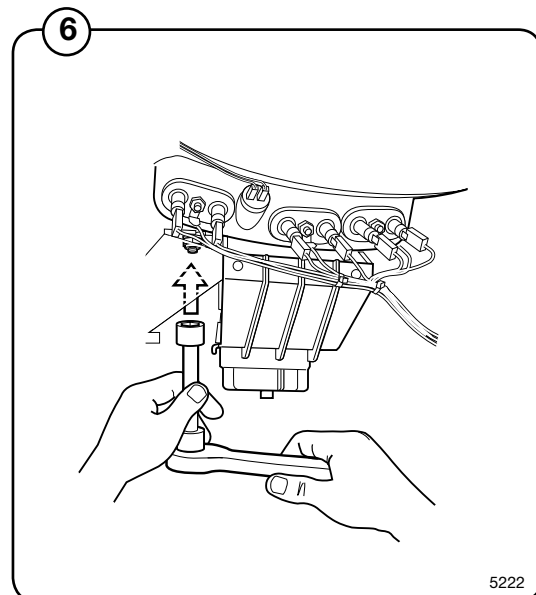
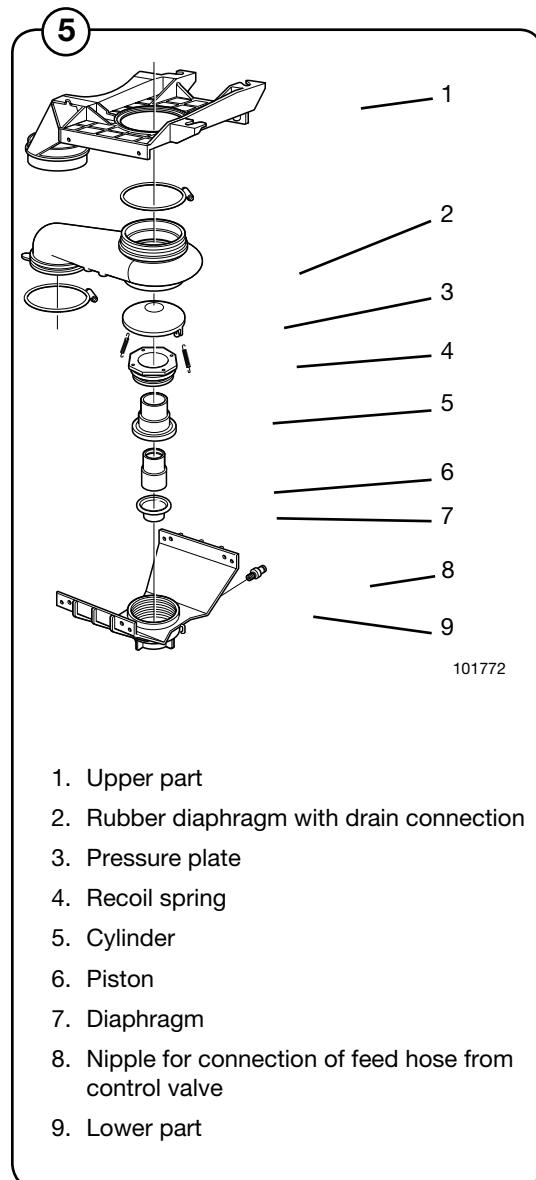
For repair works on the drain valve, there is a risk that water still left in the machine may flood onto the floor. Be sure to dry up any spilled water since it may cause people to slip and hurt themselves.

1. Take down power from the machine.
2. Remove the front cover.
3. Disconnect the drain hose from upper part of the valve.
4. Undo the hose clamp holding the valve rubber bellows against the sleeve coupling of the outer drum.
5. Loosen and unscrew the 4 retaining nuts of the valve a couple of turns (use a socket, extender and ratchet wrench). Turn the valve and unhook it from the bolts.
6. Disconnect the pressure hose from the lower part of the valve.
7. Replace the valve with a new one or replace the defective part.



Assembling

- 5 1. Connect the pressure hose to the lower part of the valve. Verify that the hose is not bent or pinched.
- 6 2. Fit the rubber bellows onto the sleeve coupling.
3. Hook the valve onto the bolts and turn the valve into position. Secure the 4 retaining bolts of the valve.
4. Secure the hose clamp at the connection of the rubber bellows on the sleeve coupling.
5. Connect the drain hose to the upper part of the valve.
6. Turn on the main power to the machine and verify correct valve operation and that it does not leak.
7. Reattach the front cover.



Detergent compartment

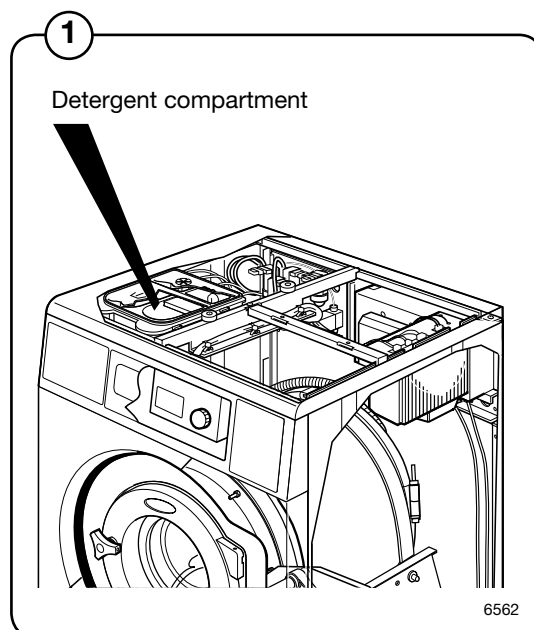
Description

- ① The detergent compartment of the machine is designed for use with powder and liquid detergent. The compartment is divided into four sub-compartments as follows:
- ②
 - Compartment 1 - For pre wash with powder or liquid detergent.
 - Compartment 2 - For main wash with detergent powder.
 - Compartment 3 - Rinse.
 - Compartment 4 - Main wash with liquid detergent or, bleaching-agent.

The connections for incoming water are situated on the rear side of the compartment. Compartments 3 and 4 each have one connector, while compartments 1 and 2 each have two connectors, one for cold water, the other for warm water.

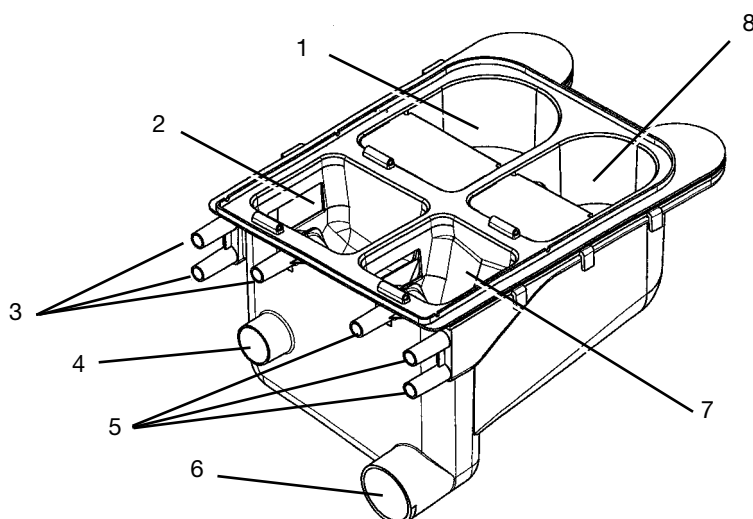
The detergent is routed from the bottom of the compartment to the outer drum through the combo module immediately behind the compartment.

To safeguard against overfilling, e.g., due to a blocked hose on its way to the drum, the combo module features an overflow drain directly connected to the drain of the machine.



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- 1 Compartment 2: Main wash, powder detergent
2. Compartment 4: Main wash, liquid detergent or bleaching-agent
3. Water connections
4. Overflow drain
5. Water connections
6. To washing drum
7. Compartment 3; Rinse
8. Compartment 1: Pre-wash with powder or liquid detergent



Heating

Description

Electric heating

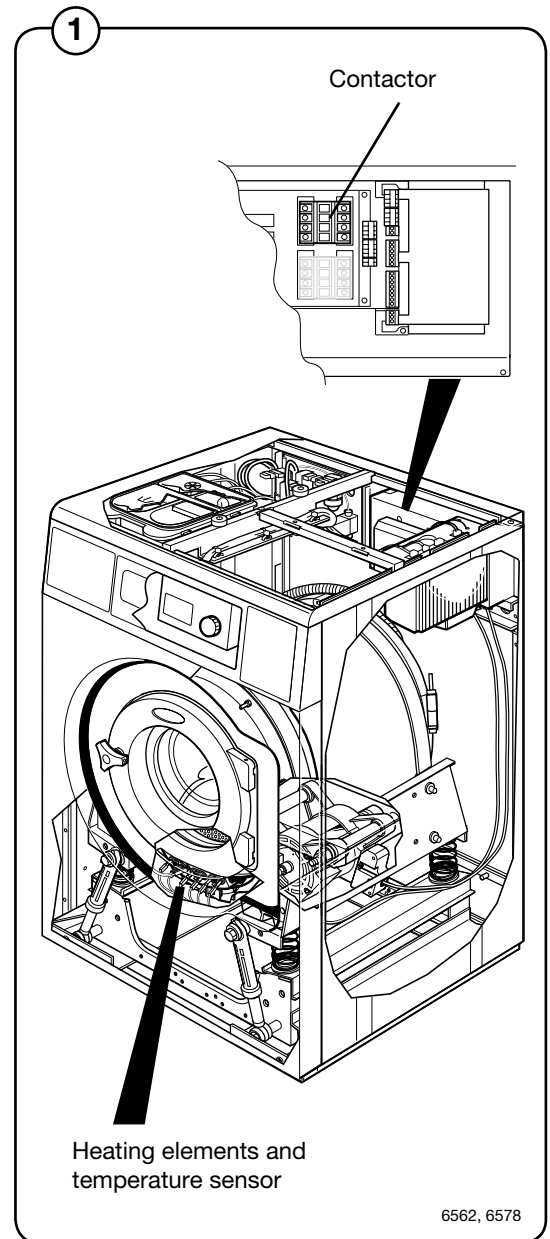
- ① The heating system of the machine consists of:
 - Three heating elements for heating the water in the drum.
 - A temperature sensor to detect the water temperature in the drum.
 - One or two heating contactors for switch-on/switch-off of the heating elements.

The heating elements and the temperature sensor are situated at the bottom of the outer drum close to the edge. They can be accessed front the front after the front plate is removed.

The contactor(s) is(are) placed in the rear control unit.

Depending on the size of the machine, the following heating elements are shown as example. Further is available.

Machine model	Heating element size (kW)
EX618	3 x 0.665, 3 x 1, 3 x 1.8, 3 x 2.5
W/SU20	3 x 0.665, 3 x 1, 3 x 1.8, 3 x 2.5
EX/W/SU625	3 x 2.5 3 x 3.3
EX/W/SU630	3 x 2 x 2.165
EX/W/SU640	3 x 2 x 3.0
EX/W/SU655	3 x 2 x 3.83
EX670, W/SU675	3 x 2 x 3,83



Function

Electric heating

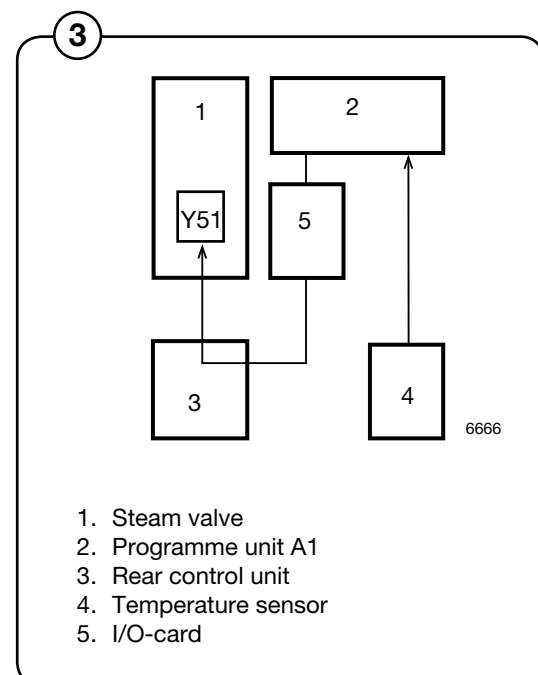
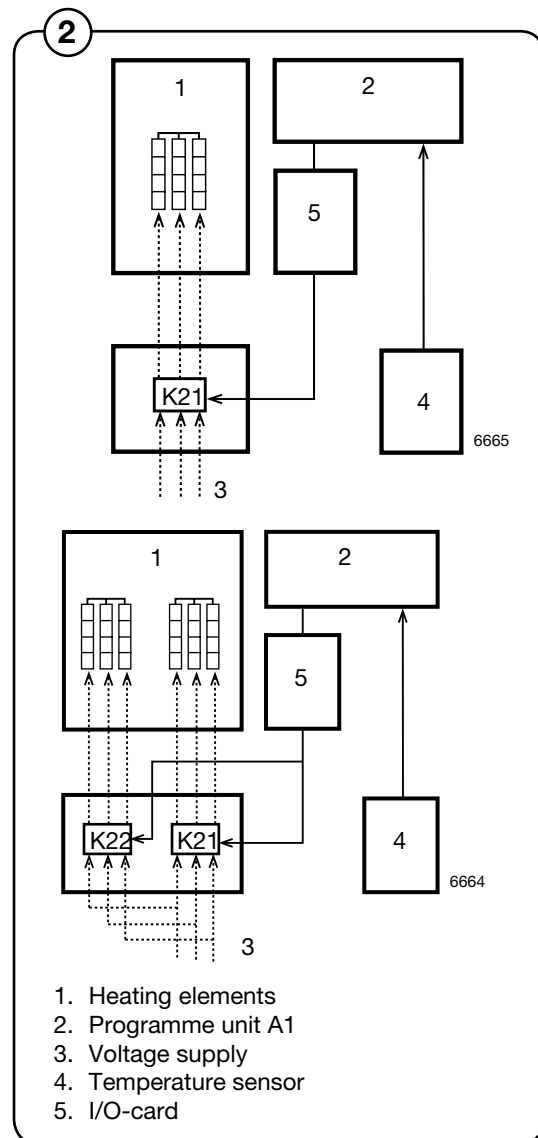
- ② The three heating elements in the machine are connected to separate phases and are switched on and using one or two heating contactors, K.21 and K22 (two contactors are used for higher heating power). The heating contactors are controlled by the programme unit A1, output (X36:7).

The programme unit receives information on the water temperature in the machine through an analogue signal from the temperature sensor situated in the outer drum. The programme unit controls the heating contactors to achieve the set water temperature for the current washing programme.

When there is no water in the drum, the programme unit prevents switch-on of the heating elements. If an error would nevertheless cause the elements to switch on, a slow-blow fuse triggers to switch them off again. Then the heating elements has to be changed.

Steam heating

- ③ The steam valve is controlled by the programme unit A1, output (X3 36:7).



Repairs



Repair work on the machine should only be done by specially trained personnel.

Replacing the heating elements

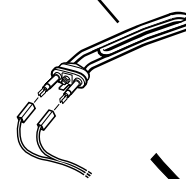


When replacing the heating elements, there is a risk that water still left in the machine may flood onto the floor. Be sure to dry up any spilled water since it may cause people to slip and hurt themselves.

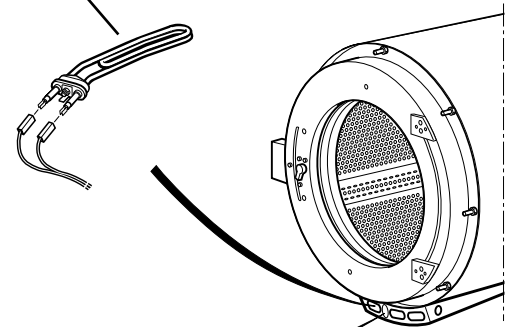
1. Take down power from the machine.
2. Remove the front cover.
3. Make a note of how the heating elements are connected.
4. Disconnect the connection to the heating element to be replaced.
5. Unscrew the nut between the connections approx. 1 cm.
6. Push on the nut and bolt to undo the expansion bracket from the outer drum.
7. Remove the old heating element and install the new one. Be sure that the rear edge is fitted into the element holder at the rear of the outer drum.
8. Assemble in reverse order.

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Heating element



Temperature sensor



5204

Abbreviations

Abbreviation	Explanation
DLCU	Door lock control unit
MCU	Motor control unit
RMC	Residual moisture control
MIS	Management information system
CBT	Central payment system
SCU	Scale unit
SW	Software
DMIS	Detergent management system
EMIS	External management information system
CW	Clock-wise
CCW	Counter clock-wise
A/D SCU	Analog/digital scale unit

Preventive maintenance

To maintain correct and proper functioning and to prevent interruption of service, the following maintenance scheme should be adhered to.

The maintenance interval should be adapted to how frequently the machine is used.

Daily

- Check the door and door lock:
 - Let the door remain open and try starting the machine. The machine should not start.
 - Close the door, start the machine and try opening the door. It should not be possible to open the door until the drum has stopped turning.
 - Check that the door does not leak.
 - Clean the door seal, removing any detergent and fluff.
- Check that the drain valve does not leak during the wash cycle.
- Clean out any detergent remaining in the detergent compartment. Rapid advance through a program and let the water rinse the compartment:

Every third month



- Check that the door does not leak.
- Check the drain valve and remove any fluff.
- Inspect the interior of the machine (during an actual wash cycle to ensure that no leaks are noticed) by:
 - Turning of the main power switch of the machine.
 - Remove the top cover and the protective front and rear plates.

- Verify that all internal hoses do not leak.
- Inspect the drive belt. Adjust the tension or replace if necessary.
- Check that water does not leak onto the floor.
- If the heating time is unusually long, check the heating elements. If the water is very hard, check whether there are lime deposits on the heating elements. Decalcify the elements if necessary. Adapt the amount of deliming agent to the manufacturer's guidelines.
- Never switch on the heating elements when there is no water in the machine. This will cause the slow-blow fuse to trigger.
- Inspect the shock absorbers and coil springs. (Only EX-model).